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VOL. XV.

GRAPHOPHONE PATENTS.

1,123,446 ----- 1,166,254.

January 5th, 1915 - December 28th, 1915.

- 1,123,446, Jan. 5, Welker, Talking Machine;
- 1,124,636, Jan. 12, Miller, Sound Box;
- 1,126,377, Jan. 26, Brophy, Record Tablet for Talking Machines;
- 1,126,382, Jan. 26, Bryant, Phonograph Record Reproducer;
- 1,126,428, Jan. 26, Edison, Sound Recording Apparatus;
- 1,126,703, Feb. 2, Catucci, Phonograph;
- 1,127,056, Feb. 2, Madden, Motor Driven Phonograph;
- 1,127,320, Feb. 2, Tiffner, Resonator;
- 1,127,765, Feb. 9, Harrison & Hupfer, Sound Reproducer;
- 1,127,873, Feb. 9, Dyer, Phonograph Reproducer;
- 1,127,908, Feb. 9, McCallie, Audiometer;
- 1,128,021, Feb. 9, McNally, Attachment for Talking Machines;
- 1,128,756, Feb. 16, Catucci, Tablet Support for Talking Machines;
- 1,129,790, Feb. 23, Clawson, Graphophone Cabinet;
- 1,129,792, Feb. 23, Cole, Phonograph;
- 1,130,099, Mar. 2, Miller, Talking Machine;
- 1,130,156, Mar. 2, Edison, Machine for Shaving Sound Records or Blanks;
- 1,130,173, Mar. 2, Kellogg, Phonograph;
- 1,130,298, Mar. 2, Kent & Lindholm, Speaker Connection for Talking Machines;
- 1,130,837, Mar. 9, Parnall, Graphophone;
- 1,130,910, Mar. 9, Lamb, Talking Machine Attachment;
- 1,131,001, Mar. 9, Pearson, Phonograph Attachment for Clocks;
- 1,131,442, Mar. 9, Travers, Sound Reproducer and Recorder;
- 1,131,454, Mar. 9, Wolfe, Sound Reproducing Machine;
- 1,131,782, Mar. 16, Holland, Phonograph Recorder;
- 1,132,092, Mar. 16, Hesselius, Manually Controlled Phonographic Mechanism;
- 1,132,287, Mar. 16, Sheble & Capps, Mounting for Sound Boxes;

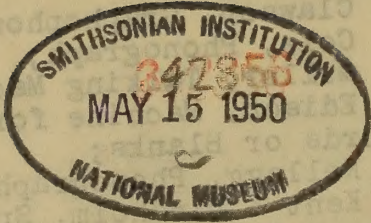


GRAPHOPHONIC PATENTS.

1,183,448 --- 1,183,554.

January 8th, 1915 - December 28th, 1915.

- 1,183,448, Jan. 8, Walker, Talking Machine;  
1,183,449, Jan. 12, Miller, Sound Box;  
1,183,450, Jan. 28, Troph, Record Tablet for  
Talking Machine;  
1,183,451, Jan. 28, Bryant, Phonograph Record  
Reproducer;  
1,183,452, Jan. 28, Edison, Sound Recording  
Apparatus;  
1,183,453, Feb. 2, Catwood, Phonograph;  
1,183,454, Feb. 2, Mahan, Motor Driven Phono-  
graph;  
1,183,455, Feb. 2, Tiltner, Resonator;  
1,183,456, Feb. 2, Harrison & Kupper, Sound  
Reproducer;  
1,183,457, Feb. 2, Dyer, Phonograph Reproducer;  
1,183,458, Feb. 2, McCallie, Audiometer;  
1,183,459, Feb. 2, McNally, Attachment for Talk-  
ing Machine;  
1,183,460, Feb. 12, Catwood, Tablet Support for  
Talking Machine;  
1,183,461, Feb. 23, Clark, Telephone Cabinet;  
1,183,462, Mar. 2, Catwood, Shaving  
Machine;  
1,183,463, Mar. 2, Catwood, Sound Recorder or Player;  
1,183,464, Mar. 2, Catwood, Speaker Con-  
nection for Talking Machine;  
1,183,465, Mar. 2, Parrish, Graphophone;  
1,183,466, Mar. 2, Lamb, Talking Machine Attachment;  
1,183,467, Mar. 2, Pearson, Phonograph Attachment  
for Clock;  
1,183,468, Mar. 2, Travers, Sound Reproducer and  
Recorder;  
1,183,469, Mar. 2, Wolfe, Sound Reproducing Machine;  
1,183,470, Mar. 12, Holland, Phonograph Recorder;  
1,183,471, Mar. 12, Heeselin, Manually Controlled  
Phonographic Mechanism;  
1,183,472, Mar. 12, Sheple & Caple, Mounting for  
Sound Boxes;





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- 1,132,497, Mar. 16, Stevens, Phonograph;  
 1,132,729, Mar. 23, Macomber, Sound Modifier;  
 1,133,685, Mar. 30, Weber, Talking Machine;  
 1,133,883, Mar. 30, Parker, Sound Box;  
 1,134,603, Apr. 6, Gabel, Automatic Talking  
 Machine;  
 1,134,774, Apr. 6, Thomas, Phonograph Disk  
 Record;  
 1,134,775, Apr. 6, Thomas, Diaphragm Setting for  
 Phonograph Reproducers;  
 1,136,739, Apr. 20, Tiffany, Phonograph;  
 1,137,001, Apr. 27, Catucci, Talking Machine;  
 1,137,187, Apr. 27, Comer, Resonator;  
 1,137,484, Apr. 27, Hayes & Johnson, Automatic Lid  
 Support;  
 1,137,487, Apr. 27, Holland, Phonograph Reproducer;  
 1,137,497, Apr. 27, Latta, Attachment for Shaving  
 Machines;  
 1,137,883, May 4, Metzeler, Talking Machine;  
 1,137,911, May 4, Schmidt, Sound Box;  
 1,138,013, May 4, Phinney, Composite Electric Sig-  
 naling System;  
 1,138,354, May 4, Catucci, Stylus for Sound Re-  
 producing Machines;  
 1,138,646, May 11, Ebeling, Stylus Positioning and  
 Circuit Controlling Means for Sound Re-  
 producing Machines;  
 1,138,755, May 11, Hess, Acoustic Instrument;  
 1,138,843, May 11, Camfield, Talking Machine;  
 1,139,224, May 11, Pumphrey, Talking Machine;  
 1,139,387, May 11, Waller, Sound Reproducing  
 Machine;  
 1,139,947, May 18, Zaiss, Commercial Talking Machine;  
 1,141,037, May 25, Busch, Stop for Tone Arms of Talk-  
 ing Machines;  
 1,141,232, June 1, Childers, Multiple Record Phono-  
 graph;  
 1,141,507, June 1, Walter, Automatic Stopping Device  
 for Phonographs;  
 1,141,672, June 1, Underhill, Sound Reproducing or  
 Recording Machine;  
 1,142,507, June 8, Edison, Sound Recording Apparatus;  
 1,142,670, June 8, Cameron, Repeating Graphophone;  
 Design No. 47,398, June 1, Johnson & Kieffer, Cabinet  
 for Talking Machines;  
 Design No. 47,399, Kieffer, June 1, Cabinet for Talk-  
 ing Machines;  
 1,142,883, June 15, Jones, Sound Box for Talking Ma-  
 chines;



- 1.138,887, Mar. 18, Stevens, Phonograph;  
1.138,738, Mar. 23, Macomber, Sound Modulator;  
1.138,685, Mar. 30, Weber, Talking Machine;  
1.138,683, Mar. 30, Parker, Sound Box;  
1.134,603, Apr. 6, Gabell, Automatic Talking  
Machine;  
1.134,774, Apr. 6, Thomas, Phonograph Disk  
Record;  
1.134,775, Apr. 6, Thomas, Diagram Setting for  
Phonograph Reproducer;  
1.138,739, Apr. 30, Tiffany, Phonograph;  
1.137,001, Apr. 30, Gurnee, Talking Machine;  
1.137,187, Apr. 30, Gurnee, Resonator;  
1.137,484, Apr. 30, Hayes & Johnson, Automatic Lid  
Support;  
1.137,487, Apr. 30, Holland, Phonograph Reproducer;  
1.137,497, Apr. 30, Latte, Attachment for Shaving  
Machines;  
1.137,883, May 4, Metzger, Talking Machine;  
1.137,911, May 4, Schmidt, Sound Box;  
1.138,013, May 4, Phinney, Composite Electric Sig-  
naling System;  
1.138,354, May 4, Gurnee, Stylus for Sound Re-  
producing Machines;  
1.138,648, May 11, Ebeling, Stylus Positioning and  
Circuit Controlling Means for Sound Re-  
producing Machines;  
1.138,735, May 11, Nees, Acoustic Instrument;  
1.138,843, May 11, Canfield, Talking Machine;  
1.138,884, May 11, Pomphrey, Talking Machine;  
1.138,387, May 11, Waller, Sound Reproducing  
Machines;  
1.138,947, May 18, Bates, Car wheel Talking Machine;  
1.141,037, May 28, Beach, Stop for tone arms of talk-  
ing Machines;  
1.141,333, June 1, Childers, Multiple Record Phone-  
graph;  
1.141,807, June 1, Walter, Automatic Stopping Device  
for Phonographs;  
1.141,878, June 1, Underhill, Sound Reproducing or  
Recording Machine;  
1.142,807, June 8, Edison, Sound Recording Apparatus;  
1.142,870, June 8, Gamson, Repeating Graphophone;  
Design No. 47,398, June 1, Johnson & Kieffer, Cabinet  
for Talking Machines;  
Design No. 47,399, Kieffer, June 1, Cabinet for talk-  
ing Machines;  
1.142,883, June 12, Jones, Sound Box for Talking Ma-  
chines;



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- 1,143,289, June 15, Leisenring, Repeating Device  
for Talking Machines;  
1,143,394, June 15, Hoffay, Sound Box;  
1,143,784, June 22, Roop, Phonograph;  
1,144,202, June 22, Hoffay, Sound Box or the Like;  
1,144,219, June 22, Madden, Repeating Phonograph;  
1,145,080, July 6, Pierman, Sound Reproducer;  
1,145,146, July 6, Johnson, Phonograph;  
1,145,360, July 6, Emerson, Sound Record and the  
Production Thereof;  
1,145,499, July 6, Mobley, Sound Box for Talking  
Machines;  
1,145,535, July 6, Woods, Sound Box for Talking  
Machines;  
1,146,260, July 13, Johnson & Dennison, Talking  
Machine;  
1,146,342, July 13, Miller, Cabinet Sound Reproduc-  
ing Machine;  
1,146,384, July 13, Aylsworth, Method of Molding  
Duplicate Sound Records;  
1,146,385, July 13, Aylsworth, Method of Molding  
Sound Records;  
1,146,386, Aylsworth, Process for Making Phonograph  
Records, July 13;  
1,146,387, Aylsworth, Disk Sound Record;  
1,146,388, July 13, Aylsworth, Process for Making  
Sound-Records;  
1,146,390, July 13, Aylsworth, Method of Molding  
Sound-Records and Other Objects;  
1,146,413, July 13, Edison, Method for Producing  
Tablets for Sound Records;  
1,146,414, July 13, Edison, Method of Making Phono-  
graph Records;  
1,146,418, July 13, Fuller, Phonograph;  
1,146,519, Repp, Phonograph;  
1,146,744, July 13, Tures, Reproducing Device for  
Phonographs;  
1,146,773, July 13, Aufiero, Metallic Acoustic  
Diaphragm and the Manufacture Thereof;  
1,147,143, July 20, Catucci, Universal Tone Arm for  
Talking Machines;  
1,147,441, July 20, Roberts, Machine for Shaving  
Graphophone Blanks;  
1,148,619, Aug. 3, Pierman, Sound Reproducer;  
1,149,514, Aug. 10, Hiles, Stylus or Needle for  
Sound Reproducing Machines;  
1,149,804, Aug. 10, Antisdale, Attachment for Talk-  
ing Machines;  
1,150,020, Aug. 17, Ettlinger, Record Disk;







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- 1,150,215, Aug. 17, McArthur & Fletcher, Horn  
for Phonographs;  
1,150,346, Aug. 17, Dennison, Sound Reproducing  
Machine;  
1,150,347, Aug. 17, Dennison, Talking Machine;  
1,150,563, Aug. 17, Walker, Sound Reproducing  
Instrument;  
1,151,472, Aug. 24, Kaufman, Sound Box;  
1,151,642, Aug. 31, Woods, Process of Pressing  
Sound Records;  
1,151,849, Aug. 31, Aylsworth & Aiken, Sound Re-  
cord and Other Object;  
1,152,343, Aug. 31, Saunders, Gramophone;  
1,152,401, Sept. 7, Dennison, Talking Machine;  
1,152,529, Sept. 7, Macdonald, Ejector or Throw-  
off for Sound Records;  
1,152,614, Sept. 7, Edison, Phonographic Record-  
ing Apparatus;  
1,152,651, Sept. 7, Lyle, Process of Pressing  
Sound-Records;  
1,153,665, Sept. 14, Woods, Correction Device for  
Talking Machines;  
1,153,837, Sept. 14, Young, Acoustic Diaphragm;  
1,155,064, Sept. 28, Hoscke, Tone Arm Connection  
for Talking Machines;  
1,155,572, Oct. 5, Holland, Phonograph;  
1,155,945, Oct. 5, Miller, Cushion for a Sound  
Box;  
Design No. 47,910, Oct. 5, Duffy, Talking Machine  
Cabinet;  
Design No. 47,911, Oct. 5, Duffy, Talking Machine  
Cabinet;  
Design No. 47,913, Oct. 5, Duffy, Talking Machine  
Cabinet;  
Design No. 47,914, Oct. 5, Duffy, Talking Machine  
Cabinet;  
Design No. 47,935, Oct. 5, Stirrup, Casing for  
Sound Producing Instruments;  
Design No. 47,936, Oct. 5, Stirrup, Casing for  
Sound Producing Instrument;  
1,156,130, Oct. 12, Catucci, Adapter for Talking  
Machines;  
1,156,217, Oct. 12, Diehl, Sound Box;  
1,156,931, Oct. 19, Repp, Phonograph;  
Design No. 48,003, Oct. 19, Livengood & Baldwin,  
Talking Machine Cabinet;  
Design No. 48,019, Oct. 19, Willson, Talking Ma-  
chine Cabinet;  
Design No. 48,020, Oct. 19, Willson, Talking Ma-  
chine Cabinet;  
Design No. 48,021, Oct. 19, Willson, Talking Ma-  
chine Cabinet;  
1,157,958, Oct. 26, Pitcher, Record Cleaning At-  
tachment for Talking Machines;







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- 1,158,316, Oct. 26, Sheble, Sound Box for Talking Machines;  
1,158,377, Eynon, Phonographic Record, Oct. 26;  
1,158,401, Oct. 26, Empson, Talking Machine;  
1,158,659, Nov. 2, Edison, Phonograph-Record;  
1,158,660, Nov. 2, Edison, Phonograph-Record;  
1,158,661, Nov. 2, Edison, Phonograph;  
1,158,728, Nov. 2, Schmidt, Sound Reproducing Machine;  
1,158,750, Nov. 2, Underhill, Phonograph;  
1,158,917, Nov. 2, Haines, Machine for Recording and Reproducing Sound;  
1,158,964, Nov. 2, Beatty, Graphophone-Record Blank;  
1,159,023, Nov. 2, Heck, Method of Comparing Sounds;  
Design No. 48,122, Nov. 9, Moyer, Talking Machine Cabinet;  
1,159,978, Nov. 9, Miller, Cabinet Sound Reproducing Machine;  
1,160,146, Nov. 16, Dayan, Attachment for Gramophones;  
1,160,268, Nov. 16, De La Rue, Gramophone;  
1,160,803, Nov. 16, White, Reproducer Support for Graphophones;  
1,160,998, Nov. 16, Isaac, Talking Machine;  
Design No. 48,188, Nov. 23, Markels, Phonograph Box or Cabinet;  
1,162,033, Nov. 30, Catucci, Spring Motor for Talking Machines;  
1,162,034, Nov. 30, Catucci, Mandrel for Talking Machines;  
1,162,202, Nov. 30, Agner, Phonograph;  
1,162,256, Nov. 30, Rotter, Apparatus for Making Phonograph Records;  
1,162,285, Nov. 30, Eckhardt, Coated Phonograph Stylus and Other Article;  
1,162,351, Nov. 30, Grupe, Sound Box;  
1,162,433, Nov. 30, Amet, Combined Phonographic and Motion Picture Apparatus for Producing Indexed Synchronous Records;  
1,162,800, Dec. 7, Nehr, Phonographic Molding Apparatus;  
1,163,120, Dec. 7, Woods, Graphophone;  
1,163,566, Dec. 7, Scotfield, Support for Talking Machine Records;  
1,163,567, Dec. 7, Scotford, Needle for Talking Machines and Method of Making the Same;  
Design No. 48,249, Dec. 7, Hunt, Phonograph Casting;







(Numerical list)

- 1,163,854, Dec. 14, Repp, Sound Box for Phonographs;  
1,164,265, Dec. 14, Davis, Combined Piano Player and Phonograph;  
1,164,401, Dec. 14, Royster, Method of and Apparatus for Synchronously Making Motion Pictures and Sound Records;  
Reissue No. 14,035, Dec. 21, Woods, Talking Machine;  
Design No. 48,311, Dec. 21, Greene, Cabinet for Phonographs;  
Design No. 48,312, Dec. 21, Greene, Cabinet for Phonographs;  
Design No. 48,313, Dec. 21, Greene, Cabinet for Phonographs;  
Design No. 48,314, Dec. 21, Greene, Cabinet for Phonographs;  
Design No. 48,315, Dec. 21, Greene, Cabinet for Phonographs;  
Design No. 48,316, Dec. 21, Greene, Cabinet for Phonographs;  
Design No. 48,317, Dec. 21, Greene, Cabinet for Phonographs;  
Design No. 48,325, Dec. 21, Menns, Phonograph Cabinet;  
Design No. 48,330, Dec. 21, Shales, Phonograph Cabinet;  
1,165,395, Dec. 28, Dennison, Sound Box;  
1,165,396, Dec. 28, Dennison, Talking Machine;  
1,165,414, Dec. 28, Johnson & English, Talking Machine;  
1,165,679, Dec. 28, Kirkman, Stop for Talking-Machines;  
1,165,927, Dec. 28, Winans, Talking Machine with Repeat Attachment;  
1,166,115, Dec. 28, Pezzer, Indicating Device for Phonography and Its Application; and,  
1,166,254, Dec. 28, Possons, Sound Box for Talking Machines.
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VOLUME XV.

GRAPHOPHONE DESIGN PATENTS. (*Arranged chronologically.*)

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Design No.	47,398,	Johnson & Kieffer,	June 1, 1915;
	47,399,	Kieffer, E.T.,	June 1, 1915;
	47,910,	Duffy, P.,	Oct. 5, 1915;
	47,911,	Duffy, P.,	Oct. 5, 1915;
	47,912,	Duffy, P.,	Oct. 5, 1915;
	47,913,	Duffy, P.,	Oct. 5, 1915;
	47,914,	Duffy, P.,	Oct. 5, 1915;
	47,935,	Stirrup, S.H.,	Oct. 5, 1915;
	47,936,	Stirrup, S.H.,	Oct. 5, 1915;
	48,003,	Livengood & Baldwin,	Oct. 19, 1915;
	48,019,	Willson, G.M.,	Oct. 19, 1915;
	48,020,	Willson, G.M.,	Oct. 19, 1915;
	48,021,	Willson, G.M.,	Oct. 19, 1915;
	48,122,	Moyer, H.C.,	Nov. 9, 1915;
	48,188,	Markels, L.,	Nov. 23, 1915;
	48,249,	Hunt, P.,	Dec. 7, 1915;
	48,311,	Greene, H.B.,	Dec. 21, 1915;
	48,312,	Greene, H.B.,	Dec. 21, 1915;
	48,313,	Greene, H.B.,	Dec. 21, 1915;
	48,314,	Greene, H.B.,	Dec. 21, 1915;
	48,315,	Greene, H.B.,	Dec. 21, 1915;
	48,316,	Greene, H.B.,	Dec. 21, 1915;
	48,317,	Greene, H.B.,	Dec. 21, 1915;
	48,325,	Menns, A.W.,	Dec. 21, 1915;
	48,330,	Shales, A.,	Dec. 21, 1915.





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Capps & Sheble,	1,132,287
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Dyer, F.L.	1,127,873

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Eckhardt, E.A.	1,162,285
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Fletcher & McArthur,	1,150,215
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Harrison & Hupfer,	1,127,765
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Heck, C.M.	1,159,023
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Hoschke, W.H.	1,155,064
Hupfer & Harrison	1,127,765
Isaac, T.	1,160,998
Johnson, J.	1,145,146
Johnson & Dennison,	1,146,260
Johnson & English	1,165,414
Johnson & Hays,	1,137,484
Jones, A.D.	1,142,883
Kaufman, E.H.	1,151,472
Kellogg, E.M.	1,130,173
Kent & Lindstrom,	1,130,298
Kirkman, T. W.	1,165,679
Lamb, C.I.	1,130,910
Latta, F.F.	1,137,497
Leisenring, F.S.	1,143,289
Lindholm & Kent,	1,130,298
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McArthur & Fletcher,	1,150,215
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Macdonald, T. H.	1,152,529
Macomber, S.M.	1,132,729
Madden, A.F.	1,127,056
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Metzeler, T.	1,137,883





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Miller, W.H.	1,130,099
Mobley, E.H.	1,145,499

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Parker, W.E.	1,133,883
Parnall, A.E.	1,130,837
Pearson, J.H.	1,131,001
Phinney, W. N.	1,138,013
Pierman, A.N.	1,145,080
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Pitcher, J.W.	1,157,958
Possons, M.A.	1,166,254
Pumphrey, W.H.	1,139,224

Repp, C.B.	1,146,519
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Roberts, H.P.	1,147,441
Roop, C.H.	1,143,784
Rotter, W.	1,162,256
Royster, D.O.	1,164,401

Sanders, J.	1,152,343
Schmidt, A.W.	1,137,911
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Scotford, L. K.	1,163,566
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Sheble, H.	1,158,316
Sheble & Capps,	1,132,287
Stevens, J. L.	1,132,497

Thomas, F.W.	1,134,774
" " "	1,134,775
Tiffany, G.S.	1,136,739
Tiffner, H.P.	1,127,320
Travers, W.J.	1,131,442
Tures, W.	1,146,744





Underhill, G.H.	1,141,672
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Walker, A.B.	1,150,563
Waller, C.W.	1,139,387
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White, C.C.	1,160,803
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Zaiss, A.A.	1,139,947





FILE.

TALKING MACHINE.

# 1,123,446 -- A. H. Welker,  
Patented-January 5, 1915.  
Filed -May 5, 1911.

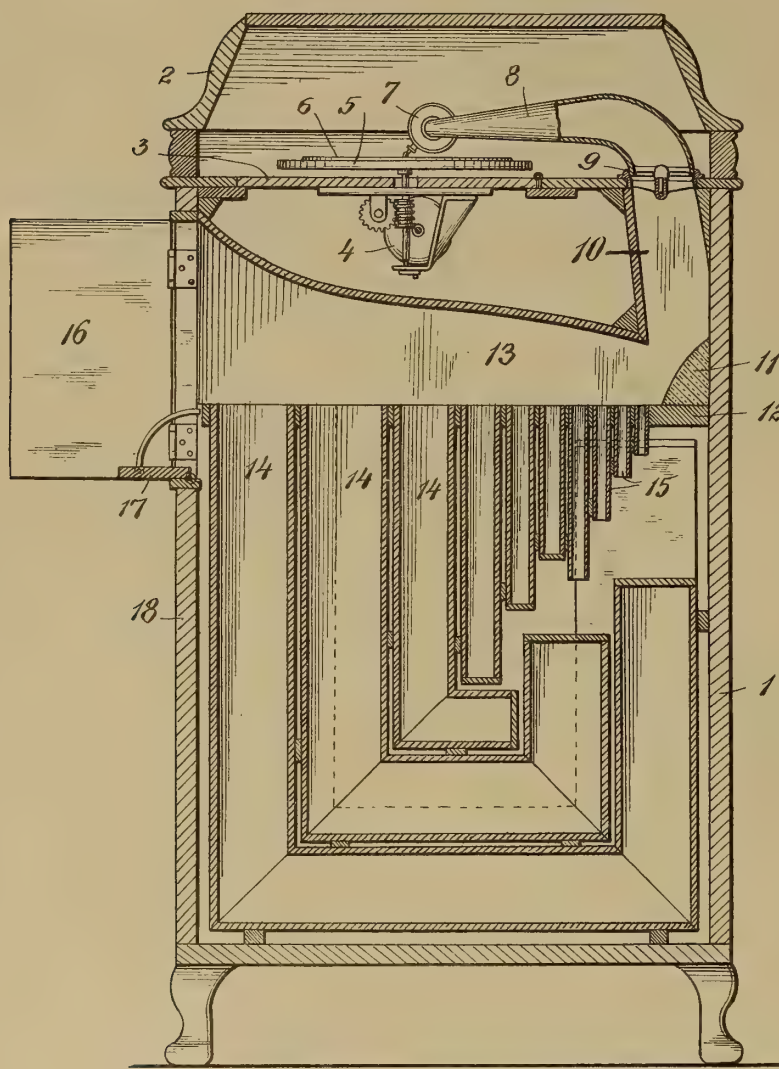
A. H. WELKER.  
TALKING MACHINE.  
APPLICATION FILED MAY 5, 1911.

1,123,446.

Patented Jan. 5, 1915.

2 SHEETS—SHEET 1.

*Fig. 1.*



WITNESSES:

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*J. Hollins*

INVENTOR

*A. H. Welker*  
BY  
*Edwards & Edwards*  
ATTORNEYS





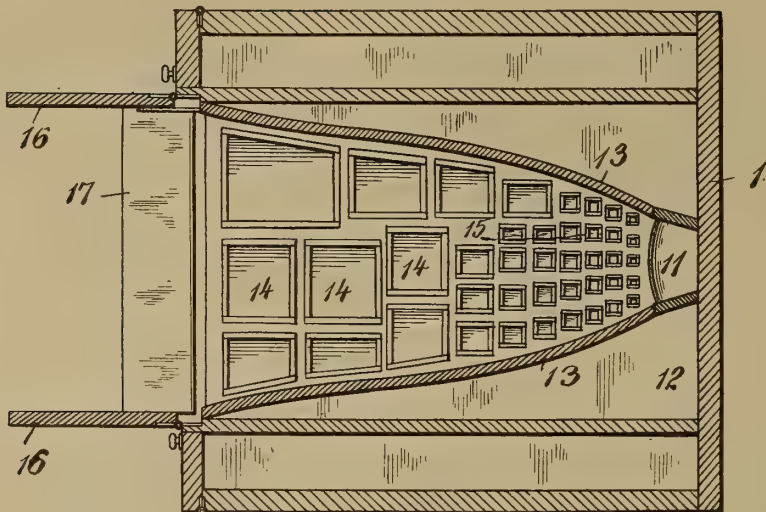
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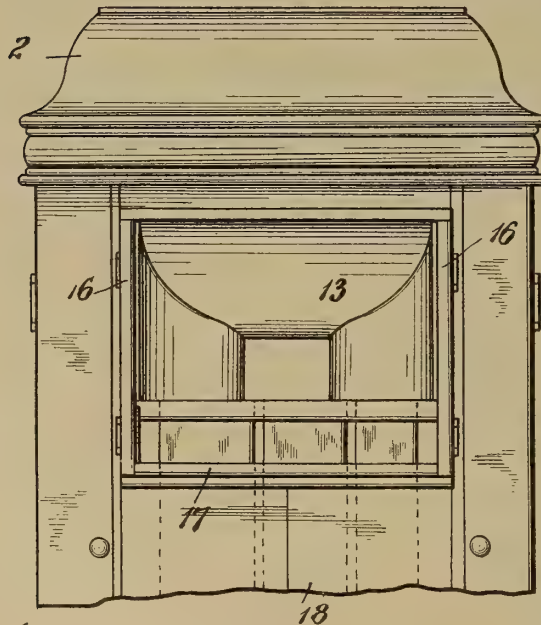
Patented Jan. 5, 1915.

2 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 3.*



WITNESSES:

*J. W. Dutch*  
*J. F. Collins*

INVENTOR

*A. H. Welker*

BY  
*Edw. Edwards*  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

ALEXANDER H. WELKER, OF BERLIN, ONTARIO, CANADA.

## TALKING-MACHINE.

1,123,446.

Specification of Letters Patent.

Patented Jan. 5, 1915.

Application filed May 5, 1911. Serial No. 625,143.

*To all whom it may concern:*

Be it known that I, ALEXANDER H. WELKER, a subject of the King of Great Britain, residing at Berlin, in the county of Waterloo, Province of Ontario, Canada, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to talking machines and has reference particularly to the sound-reproducing and amplifying devices employed in such machines.

The object of the invention is to effect certain improvements in the construction of talking machines whereby a more faithful reproduction of the recorded sounds is obtained. To this end the machine is so constructed that the reproduced sounds are sweeter, more mellow and to a greater extent free from foreign sounds than is the case with machines of the constructions heretofore commonly employed.

The invention involves the use of a plurality of pipes or resonance chambers arranged in coöperation with the sound-conveying and amplifying passage of the machine so that the sound-waves pass over or into the open ends of these pipes. The pipes or resonance-tubes vary in construction as to their cross-sectional dimensions and as to their length; also, some of the pipes preferably have their ends distant from the sound-conveying passage closed while others have their distant ends open. Preferably, the resonance tubes are so arranged that they increase in cross-section toward the exit end of the sound-conveying passage. With resonance tubes so arranged, I have found in practice that results are obtained which are far superior to those commonly obtained heretofore, the superiority being in the sweetness and purity of the reproduced sounds and also in their increased volume.

The invention is preferably employed in a talking machine of the type now commonly known as a "hornless" machine, in which the sound-conveying passage is formed within the cabinet of the machine. In machines of this type, it has been common heretofore to make the turns in the sound-conveying passage curved so that the sound waves will pass the more readily therethrough. In my improved machine,

instead of providing such curves throughout the sound-conveying passage, I employ at one of the turns in the passage a reflector for sound-waves upon which those waves impinge and by which they are deflected in the desired direction. With such a reflector the sound-waves may be readily directed in such manner that they will enter the open ends of the resonance tubes at the desired angle.

I have illustrated the preferred embodiment of my invention in the accompanying drawings in which—

Figure 1 is a central section of a machine embodying my invention, Fig. 2 is a horizontal section through the sound-conveying passage above the ends of the resonance tubes and Fig. 3 is a front view of the upper portion of the machine.

Referring to these drawings, 1 is the casing of the machine, preferably of rectangular form and having at the top thereof a hinged cover 2. Below this cover is a horizontal partition 3 to the under side of which is secured the motor 4 adapted to drive the vertical shaft upon which the turn-table 5 of the machine is mounted. This turn-table sustains and rotates a sound-record 6 of disk form with which coacts the stylus of the sound-reproducer 7. This reproducer is mounted upon the end of a tapering tone-arm 8 whose opposite end is deflected downwardly and is pivotally mounted upon a suitable bearing 9 secured upon the partition 3.

Within the casing 1 is a passageway communicating with the pivoted end of the tone-arm 8 and extending downwardly therefrom. At the lower end of this passage 10 is a sound-reflector 11 preferably made of glass, though it may also be made of wood or any other suitable material. This reflector is preferably positioned against the rear wall of the casing 1 and disposed horizontally therein. The passage 10 for the sound-waves is extended by a passage 13 disposed horizontally and leading from the reflector 11 at the rear of casing 1 through the casing to the front wall thereof. This passageway 13 is enlarged both vertically and horizontally toward the front of the machine as shown.

A plurality of pipes or resonance tubes are combined with the parts above de-



scribed, these being so disposed that their ends project into the passageway for the sound-waves. Preferably the tubes are so arranged that the sound-waves are deflected upon the ends of the tubes so that more or less of the sound-waves will enter the tubes. In the drawings a plurality of resonance tubes 14 are shown each having one end extending through an opening in the partition 12, these ends of the tubes being open. The opposite ends of the tubes 14 are closed and these ends may be turned at a right-angle one or more times so that the tubes will be disposed more compactly. The tubes 14 are preferably of varying cross-sectional areas, those adjacent to the outer end of the sound-conveying passage 13 being preferably the largest. Near the inner end of the passage 13, the resonance tubes preferably have their lower ends open as shown at 15 in Fig. 1.

The surface of the reflector 11 is accurately formed with respect to the relative positions of the reflector and the open ends of the resonance tubes 14 and 15. The formation in this respect is such that the sound-waves passing through passage 10 will be reflected by the reflector 11 through the passage 13 downwardly slightly upon the ends of the resonance tubes 14 and 15 so that more or less of the sound-waves pass into the sound-tubes and cause sympathetic vibration thereof.

The sound-waves pass out from the casing 1 through double doors 16 hinged to the side walls of an opening provided in the front wall of casing 1. An auxiliary door 17 may be provided if desired turning on a horizontal axis and being within the doors 16 when the parts are in the closed positions. The front wall of the casing below the doors 16 may be provided with doors, as shown at 18, so that the space about the tubes 14 and 15 may be thrown into communication with the exterior of the casing 1.

The operation of the mechanism constructed as above described will be readily understood. In practice I have found that with this construction results are obtained which are superior in the purity and volume of the reproduced sounds to those obtained with machines of this type as now commonly constructed.

Having described my invention, what I

claim as new therein and desire to secure by Letters Patent of the United States is:

1. A talking machine comprising a casing, a sound reproducer therein, a forwardly-directed sound-amplifying passageway extending through said casing and connected to said reproducer, and a plurality of resonance tubes located within the casing and opening into said passageway, said tubes being of different cross-sectional area and arranged so that the cross-sectional area and length of the tubes increase from the rear of the casing toward the exit end of said passageway, the cross-sectional area of said passageway also increasing from the rear toward the exit end thereof, substantially as set forth.

2. A talking machine comprising a casing, a sound reproducer therein, a forwardly - directed horizontally disposed sound-amplifying passageway extending through said casing and connected to said reproducer, and a plurality of vertical resonance tubes located within the casing below said passageway with their upper ends opening into the same, said passageway being provided with means for directing sound waves downwardly toward the upper ends of said tubes, and said tubes being of different lengths and cross-sectional areas and nested together with the lower ends of the longer tubes bent angularly about the lower ends of the shorter tubes, substantially as set forth.

3. A talking machine comprising a casing, a sound reproducer therein, a forwardly - directed horizontally disposed sound-amplifying passageway extending through said casing and connected to said reproducer, and a plurality of vertical resonance tubes located within the casing below said passageway with their upper ends opening into the same, said tubes being of various lengths and cross-sectional areas, with the smaller tubes to the rear, and said tubes being nested together with the lower ends of the longer tubes bent angularly to the rear, substantially as set forth.

This specification signed and witnessed this 24th day of April, 1911.

ALEXANDER H. WELKER.

Witnesses:

ARTHUR B. POLLOCK,  
J. A. SELLEN.



# 1,124,636      SOUND BOX.  
-- H. C. Miller,  
Patented-January 12, 1915.  
Filed      -May      1, 1906.

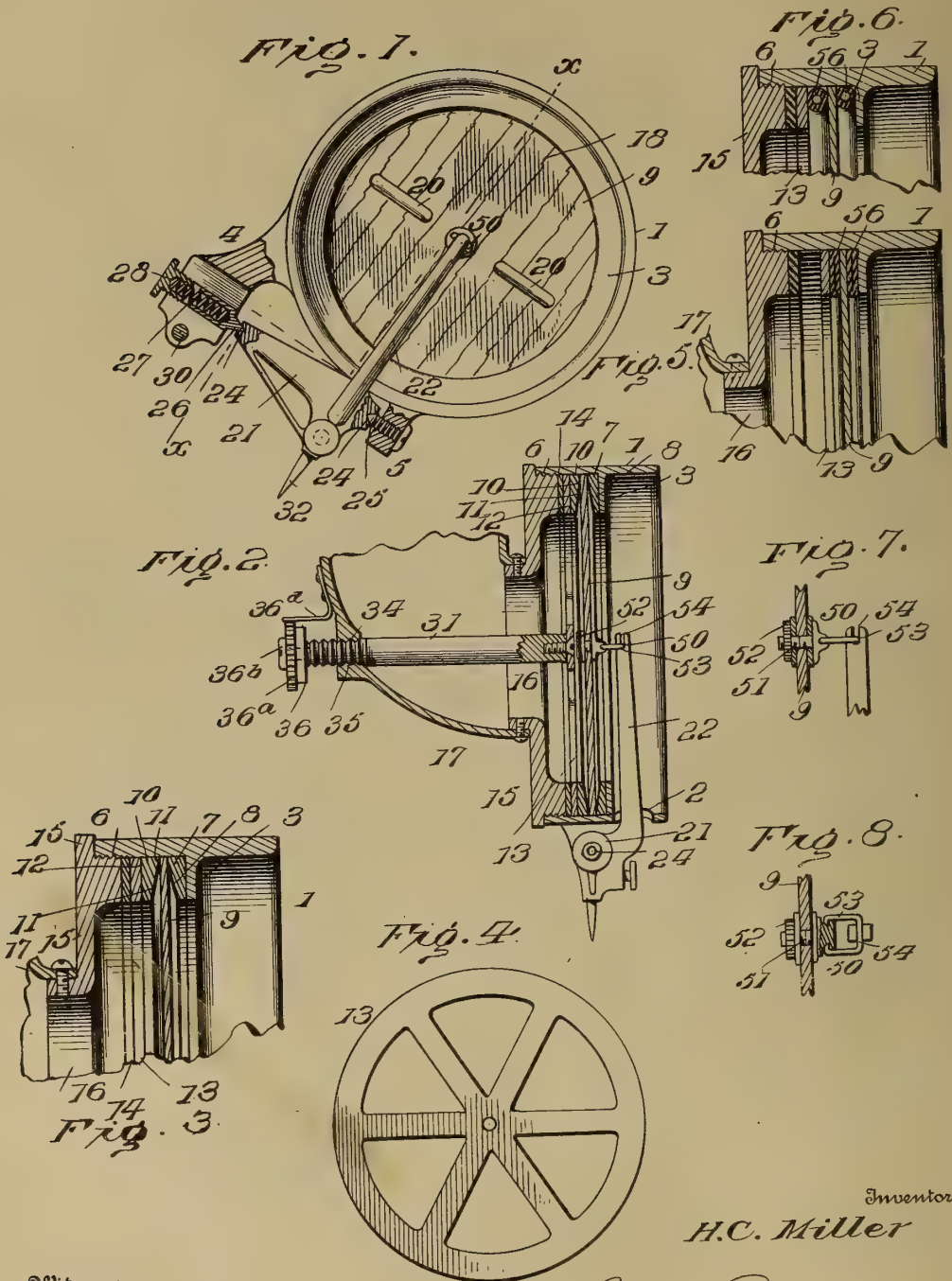
H. C. MILLER.  
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APPLICATION FILED MAY 1, 1906.

1,124,636.

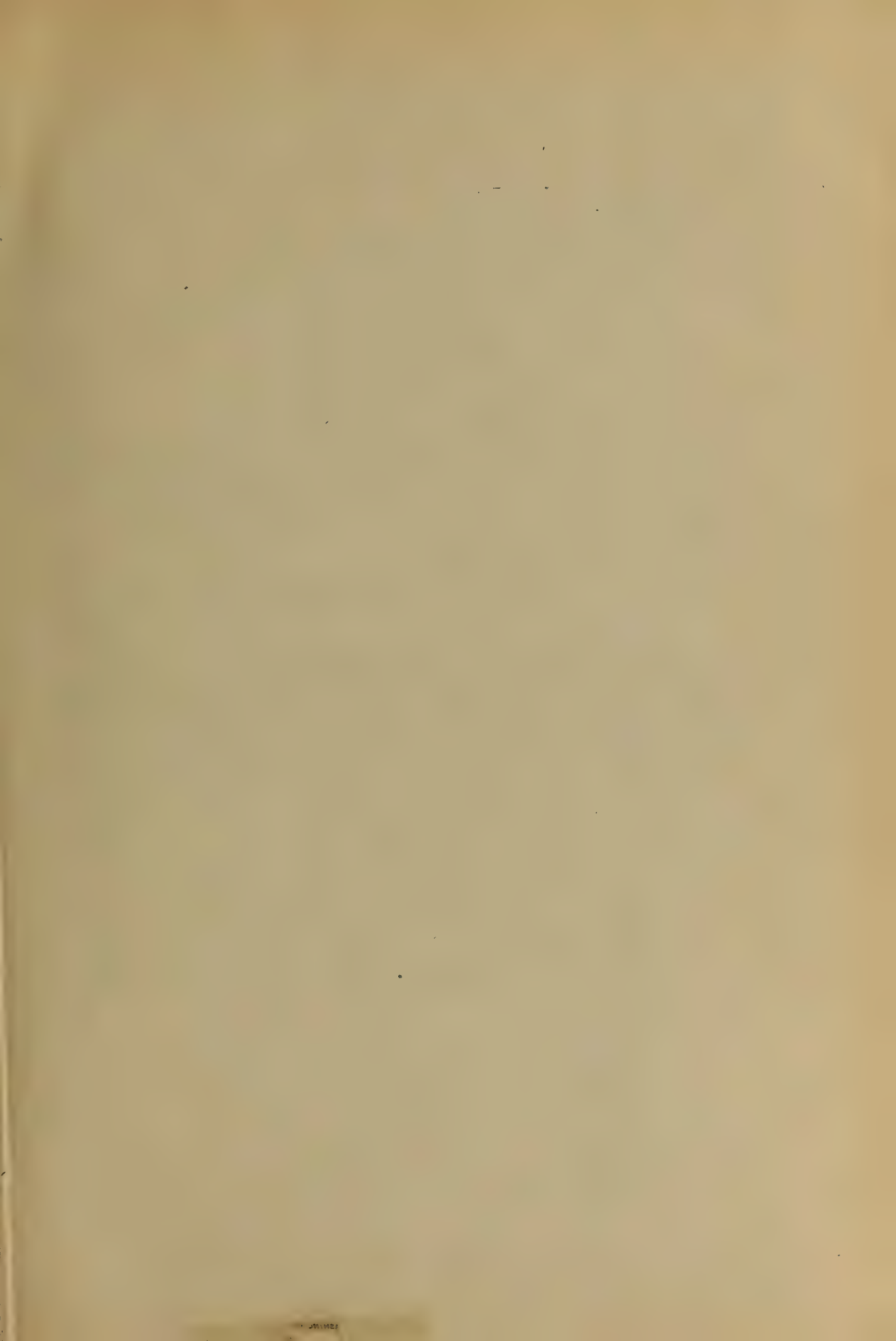
Patented Jan. 12, 1915.

2 SHEETS-SHEET 1.



Witnesses  
A. P. Williams  
A. H. Bennett.

Inventor  
H. C. Miller  
By *[Signature]*  
Attorney

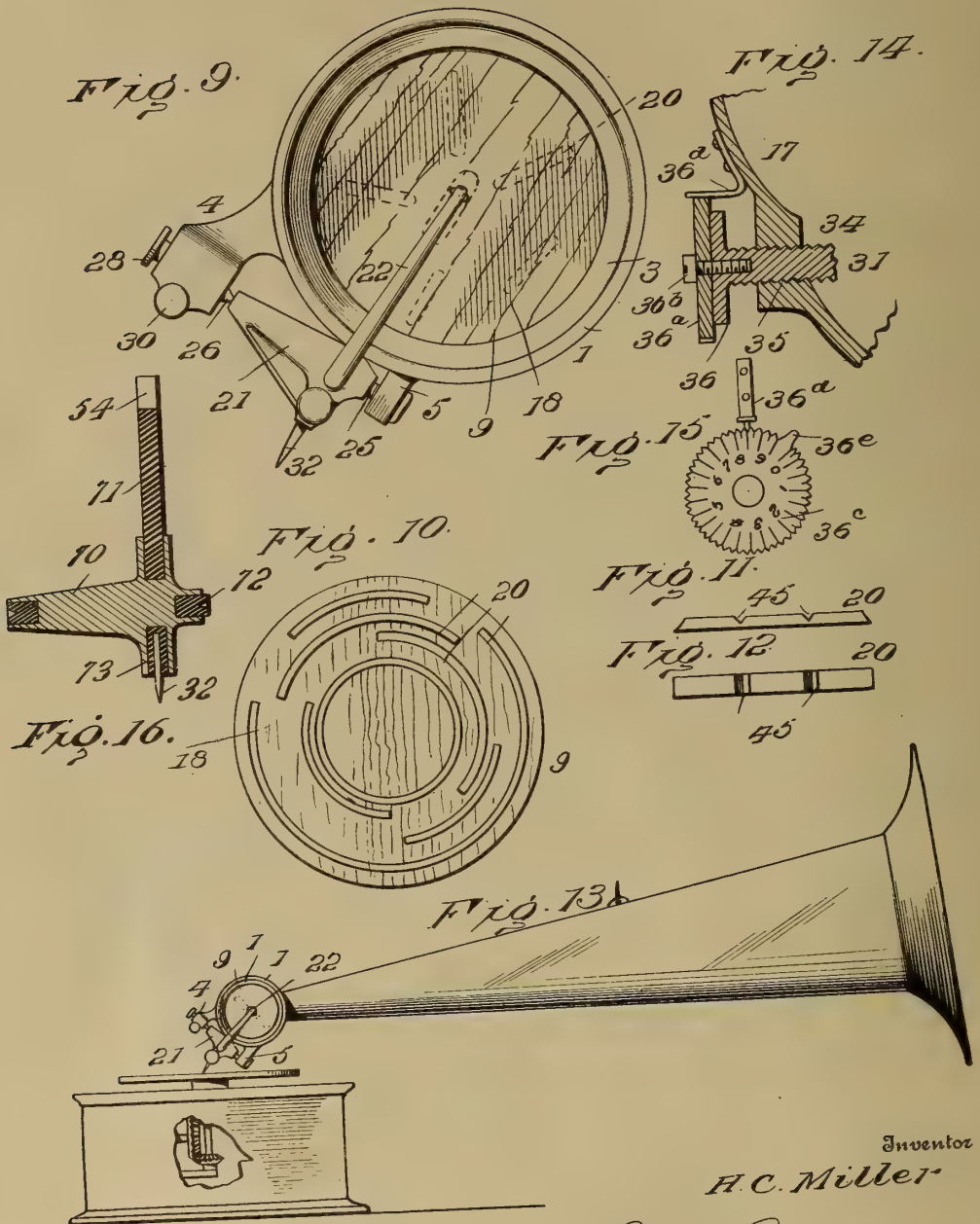




H. C. MILLER.  
SOUND BOX.  
APPLICATION FILED MAY 1, 1906.

Patented Jan. 12, 1915.  
2 SHEETS—SHEET 2.

1,124,636.



Witnesses

A. B. Williams  
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J. H. Miller  
Attorney

# UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

## SOUND-BOX.

1,124,636.

Specification of Letters Patent.

Patented Jan. 12, 1915.

Application filed May 1, 1906. Serial No. 314,654.

*To all whom it may concern:*

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to improvements in sound boxes for talking machines, of the type shown in my Patent No. 793,012, dated June 20, 1905.

Those familiar with this art and with present talking machines find the sound produced is deficient in quality, in that it is harsh and unnatural. These differences exist particularly with musical selections. I attribute these difficulties to the imperfect construction, and the imperfections in material, principally of the parts constituting the sound box. The defects are furthermore present because of the necessity of limiting the diameter of the diaphragms, on account of the inherent difficulties in securing suitable material of absolutely homogeneous character.

It is my purpose to improve the sound box by using a wooden diaphragm, applying a tuning or modifying element, employing a stylus lever and bar of hard rubber or like non-conducting material, and means for adjusting and regulating the diaphragm. By these various details of construction a diaphragm of larger area than commonly used may be employed; the desired pitch may be obtained; range of power and compass increased and the quality of sound improved, so that the several musical instruments and voices recorded on a record can be distinguished.

I also find that a sound box of the general structure indicated, prevents interference of sound, and in a large measure harsh sounds are obviated.

The diaphragm adjustment also permits an operator to regulate the diaphragm to suit individual taste, according to the special characteristics of a selected piece being reproduced.

Other objects and advantages will be here-

inafter referred to and particularly pointed out in the claims.

In the drawings—Figure 1 is a side elevation of my improved sound box, parts being shown in section. Fig. 2 is an enlarged vertical transverse section on the line  $x-x$  of Fig. 1. Fig. 3 is an enlarged detail vertical transverse section of the sound box. Fig. 4 is a detail view of a spider. Fig. 5 is a view similar to Fig. 3 but showing the washers compressed. Fig. 6 is a detail view of a slight modification. Figs. 7 and 8 are detail views of means for securing the stylus lever to the diaphragm. Fig. 9 is a face view of the sound box showing a different arrangement of attaching the modifying elements thereto. Fig. 10 is a face view of the diaphragm showing modifying elements of different formation. Figs. 11 and 12 are detail views of a special form of modifying element. Fig. 13 is a view showing the invention in connection with a horn. Fig. 14 is a detail sectional view of the means employed for altering the pitch of the diaphragm. Fig. 15 is a detail elevation of the same. Fig. 16 is a detail view of a slight modification.

The numeral 1, indicates a sound box formed in its periphery with an opening 2; interior flange 3; bearings 4, and 5; and internal threads 6.

Bearing against one face of the flange 3, is the flat surface of a preferably rubber washer 7, beveled on its opposite face at 8, to bear on the outer face of a wooden diaphragm 9.

A washer 10, similar to washer 7, bears on the opposite side of the diaphragm 9, and holds the same relative position to the diaphragm as washer 7. That is, its beveled surface 11, bears on the diaphragm, while its flat face 12, co-acts with a spider 13. On the other side of spider 13, is a rubber washer 14, and bearing directly on said latter washer is the flange of a cover plate 15, threaded to engage the threads 6, of the sound box. The cover plate is formed with a flanged opening 16, and communicating therewith is the end of a sound tube 17.

The grain 18, of the wood of the dia-



phragm is as near straight as can be secured, and preferably runs in line with the stylus lever, and is suitably coated to protect it from atmospheric changes. On one or both faces of the diaphragm I place a modifying element or elements 20, the surrounding edges and the outer face of each element being entirely free, and each element is wholly disconnected from the other, except through the diaphragm.

The stylus bar 21, and lever 22, are preferably formed of hard rubber or similar composition, and in one piece. The internal sound non-conductive qualities of this material are well known, and it is my purpose in using it to suppress those sound vibrations which tend to cause buzzing or like unnatural conditions when reproducing a voice or a piece of music. While it is true this material is effective in suppressing the unnatural vibrations, it is also true that the more natural and essential vibrations of the selection being reproduced, are, accurately and minutely produced, resulting in what may be termed the highest quality of sound.

The stylus bar 21, is formed at its ends with two conical depressions 24—24, into which fit the ends of conical journals 25 and 26. The journal 25, is in the form of a screw seated in a threaded opening in the bearing 5, while the journal 26, is cup shaped to receive a spring 27, bearing at its opposite end in a seat in an adjusting screw 28, working in the threaded end of an opening in the bearing 4. Bearing 4, is split at its free end for the free passage of the journal 26, and a screw 30, in the ends of said bearing, serves to fix the stylus bar in position after it has been adjusted. The stylus lever 22, is in line with the stylus 32, and passes through opening 2, and as before stated is preferably of hard rubber and formed with the stylus bar.

I have found it to be quite essential to provide a single adjusting means exterior of the sound box to alter the pitch of the diaphragm, that each record may be reproduced, in accord with the original. This means consists preferably of a rod 31, swiveled in the center of the spider 13, and having at its outer end threads 34, engaging a threaded opening 35, in the sound tube 17. The outer end of the rod is formed with a head piece 36, and provided with a dial plate 36<sup>a</sup>. The dial plate 36<sup>a</sup>, is fastened to the head piece 36, by a screw 36<sup>b</sup>, passing into a threaded opening in the rod 31. On the face of the dial plate are arbitrary indicating marks, each mark representing a determined pitch, and opposite the marks are indications 36<sup>c</sup>, with which a spring pressed locking device 36<sup>d</sup> coöperates to hold the parts in set position after they have been

adjusted, a stop 36<sup>e</sup>, limiting the movement of the dial plate.

When positioning the dial plate, the diaphragm is first set to zero, and the plate is placed against head 36, with the stop 36<sup>e</sup>, against the locking device, and then the screw 36<sup>b</sup>, is screwed into place to bind the dial plate to the head piece 36. The stop will limit the movement of the rod and prevent the diaphragm being clamped too tight.

50 indicates a hinge connection between the stylus lever and the diaphragm which permits vibration of the parts without binding. This connection consists of a headed screw 51, passed through an opening in the diaphragm and provided on its inner end with a nut 52, and a link 53, engaging an opening in the head of the screw, and a slot 54, in the end of the stylus lever.

In Fig. 6, 56, indicates sectional rubber tubing in place of beveled washers shown in Figs. 3 and 4.

The modifying element may be made in various ways, and is of such material as will permit of its being shaved down, or peeled to reduce its dimensions. As shown in the preferred embodiment of the invention a single piece, preferably wood, is employed, but this may not be of sufficient area to meet the requirements with a diaphragm having a low pitch. I, therefore may use a tuning element as shown in Figs. 11 and 12, which consists of an elongated piece of material, provided with one or more grooves or weak points 45—45, so that if it is found a large area is necessary little trimming will be required, but if the larger area is not wanted such trimming will be effected by breaking the element at the grooves, and then trimming it down to obtain sufficient elasticity of the diaphragm to produce the desired results.

By placing a strip of wood on a thin wooden diaphragm, which has been previously treated to resist atmospheric changes, several important results are accomplished. Each diaphragm is different from the other, and the peculiarities are determined in each instance by testing, and to make each diaphragm produce and transmit sound vibrations naturally in tune and in unison with a standard, it is quite essential that the grain, and the requisite thickness of wood be carefully considered. I find that a thickness of approximately one two hundredths of an inch will produce a diaphragm having a pitch below the original sound, and then by placing upon the surface thereof one or more pieces or strips of wood of dimensions in excess of requirements, and gradually remove fractional portions thereof, guided of course by sound tests, until the reproduced sound is in accord with the original. This construction will permit of the diaphragm



being made larger than is now the custom, because the tuning element may be so regulated as to make the result affective in proportion to its size.

5 The regulation of the active diameter of the diaphragm is quite essential to alter its pitch which contributes to produce the result obtained with my invention. Therefore, I utilize the beveled washers and the adjusting means to uniformly, and by one operation increase or decrease the dimensions of the active surface of the diaphragms, which of course, alters the properties of the sound emitted. This feature is of the utmost importance because of the fact that a particular record may require a greater or less active diaphragm surface to produce the quality of sound, and must be arranged to be regulated in a convenient and quick manner. While I have described specifically the special parts which contribute to make up a sound box for the production of, and preserving the essential quality of sound, nevertheless, the combined action of these structural details cooperate to bring about the desired result.

So far as I am aware, I am the pioneer in the art, using a wooden diaphragm and permanently modifying it to get the best results, and yet providing means for regulating the pitch and harmony of sound produced. By tests and actual practice, I have found it absolutely necessary to obtain the best quality of sound, to modify the diaphragm to be in accord with the horn.

In Fig. 16, a stylus lever is shown, composed of metal and rubber or like material. 70 represents the metal stylus bar; 71, a rubber stylus lever; 72, rubber bearings in the stylus bar, and 73, a rubber stylus holder.

While I have described what I regard as the preferably details of construction to cooperate with each other to produce the best result, it will be obvious minor changes may be made without departing from the spirit and scope of my invention. For instance the stylus bar may be formed in part or complete in metal; the fulcrums of the same may be provided with springs; the diaphragm may be constructed of any material, and the pitch adjustment may be omitted. Either of the changes or omissions noted may be made to produce a particular result with a given record.

It is to be understood that the improvements herein described are to be used in connection with a diaphragm for reproducing or recording purposes.

What I claim is:

1. A sound box having a wooden diaphragm, a stylus lever and bar, and a modifying element located across the grain of the wooden diaphragm.

2. A sound box having a wooden dia-

phragm coated with a hardening solution, a modifying element secured to the coated face of the diaphragm and across the grain of the wood, and a stylus lever and bar cooperating with the diaphragm and the modifying element.

3. A sound box having a wooden diaphragm and a modifying element provided with grooves on its outer face, and extending across the grain of the wood.

4. A sound box having a wooden diaphragm, and a modifying element provided with grooves and secured to the diaphragm.

5. A sound box having a diaphragm, a stylus lever and bar cooperating therewith, bearings for the stylus bar, one of said bearings being spring pressed, a regulating screw operating to compress or release the spring in line with the stylus bar, and means for fixing the position of the regulating screw.

6. A sound box having a diaphragm, a stylus lever and bar cooperating therewith, bearings for the stylus bar, one of said bearings being spring pressed, means operating to compress or release the spring in line with the stylus bar, and means for fixing the position of the former means.

7. A sound box having a wooden diaphragm, modified by a strip attached diametrically thereto and across the grain of the diaphragm, and a stylus lever and bar of one piece of hard rubber.

8. In combination, a sound box having a cover, a sound tube communicating with the rear of the sound box, a diaphragm, resilient washers bearing on the diaphragm, a spider on the inside of the sound box and bearing on one of the resilient washers, a rod extending from the spider and through the tube for adjusting said spider, and a bearing formed in the sound tube to receive the rod.

9. A sound box having a wooden diaphragm with its grain running parallel with the stylus lever, a stylus bar and lever formed of a single piece of hard rubber, and a modifying element secured across the grain of the diaphragm.

10. The combination with a sound box provided with a diaphragm, a stylus lever and bar formed of one piece of hard rubber, a modifying element on the diaphragm, a cover formed with an opening and secured to the sound box, a sound tube secured to the cover, washers, and a rod passing through the sound tube to regulate the pressure of the washers on the diaphragm.

11. A sound box having a diaphragm with a modifying element attached thereto, and a stylus lever attached directly to said diaphragm and wholly disconnected from the modifying element except through the diaphragm.

12. A sound box having a diaphragm pro-

vided with a series of diametrically disposed modifying elements, and a stylus lever and bar formed of one piece of hard rubber and attached directly to the diaphragm and wholly disconnected from the modifying elements.

13. A sound box having a diaphragm, a grooved modifying element cooperating with the diaphragm, and a stylus lever attached directly to the diaphragm.

14. A sound box having a diaphragm with a series of modifying elements disposed on opposite sides of a stylus lever, and a stylus lever directly attached to said diaphragm at a point between the series of modifying elements and wholly disconnected from the stylus lever except through the diaphragm.

15. A sound box having a diaphragm, a modifying element formed of wood and attached to the face of the diaphragm to tune said diaphragm, and a stylus lever attached directly to the diaphragm but wholly disconnected from the modifying element except through the diaphragm.

16. A sound box having a diaphragm modified by elements attached to its face, a stylus lever directly attached to the diaphragm, washers on opposite sides of the diaphragm and having their adjacent faces beveled and means for compressing the washers to cause their beveled faces to gradually engage the diaphragm from its edge toward its center to change the pitch.

17. A sound box having a casing and a diaphragm, a stylus lever, and modifying strips on the diaphragm, said strips being disconnected from each other and from the stylus lever except through the diaphragm and stopping short of said casing.

18. A diaphragm having modifying elements attached thereto, said modifying elements being attached to the surface of the diaphragm and having their edges and one face free, and a stylus lever attached directly to the diaphragm.

19. A diaphragm modified by strips sufficiently thick to be reduced after having been applied to the diaphragm, each of said strips having an attaching surface which extends throughout the whole of its length, and a stylus lever attached directly to the diaphragm and wholly disconnected from the modifying strips.

20. A diaphragm modified by a strip subdivided by grooves.

21. A wooden diaphragm modified by diametrically arranged modifying strips independent of and wholly disconnected from each other, except through the diaphragm, and a stylus lever attached to the diaphragm.

22. A wooden diaphragm modified by a wooden strip, said wooden strip being

spaced at one end from a stylus lever, and terminating at its opposite end short of the edge of the diaphragm, and a stylus lever attached directly to the diaphragm.

23. A diaphragm modified by strips attached to its face, each strip having its edges and one face free and being wholly disconnected from the adjacent strip except by connection through the diaphragm, and a stylus lever attached directly to the diaphragm.

24. A sound box having a diaphragm modified by strips attached thereto, the outer edges and one face of the strips being free, and a pivoted stylus lever of non-metallic material attached directly to the diaphragm and wholly disconnected from the modifying strips.

25. A sound box comprising a casing, a flexible diaphragm having attached thereto a flexible modifying element having a surface to be attached to the diaphragm and designed to be reduced after having been applied to said diaphragm for modifying the sound given out by the latter, the modifying element being secured to the diaphragm throughout the whole of its attaching surface, and a stylus lever for vibrating the diaphragm and the modifying element.

26. A diaphragm having a series of modifying elements attached to its surface, said elements being composed of material adapted to be reduced after having been attached on the diaphragm for the purpose of modifying the tone of the diaphragm down to a standard, each element being disconnected from the other except through the diaphragm.

27. A sound box comprising a casing, a flexible diaphragm having attached thereto a flexible modifying element wholly disconnected from the casing and having a surface to be attached to the diaphragm and designed to be reduced after having been applied to said diaphragm to modify the sound given out by the latter, the modifying element being secured to the diaphragm throughout the whole of its attaching surface, and a stylus lever for vibrating the diaphragm and the modifying element.

28. A sound box comprising a diaphragm, a stylus lever, and modifying elements secured to the diaphragm in series each side the stylus lever, said modifying elements being spaced from each other and wholly disconnected from each other except through the diaphragm.

29. A diaphragm having attached to it a plurality of modifying elements alined with each other and also spaced from each other and wholly disconnected from each other except through the diaphragm, each modifying element being located between a



stylus lever and the edge of the diaphragm, and a stylus lever attached directly to the diaphragm.

30. A diaphragm having a modifying  
5 element attached thereto, said modifying element being attached to the surface of the diaphragm and having its edges and one face free, and a stylus lever attached directly to the diaphragm.

10 31. A sound box having a diaphragm, modified by a strip attached thereto, the outer edges and one face of the strip being

free, and a pivoted stylus lever of non-metallic material attached directly to the diaphragm and wholly disconnected from 15 the modifying strip.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

WM. F. PALMER,

GEO. L. RICHARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





RECORD TABLET FOR TALKING MACHINES.

# 1,126,377    --    O. O. Brophy,

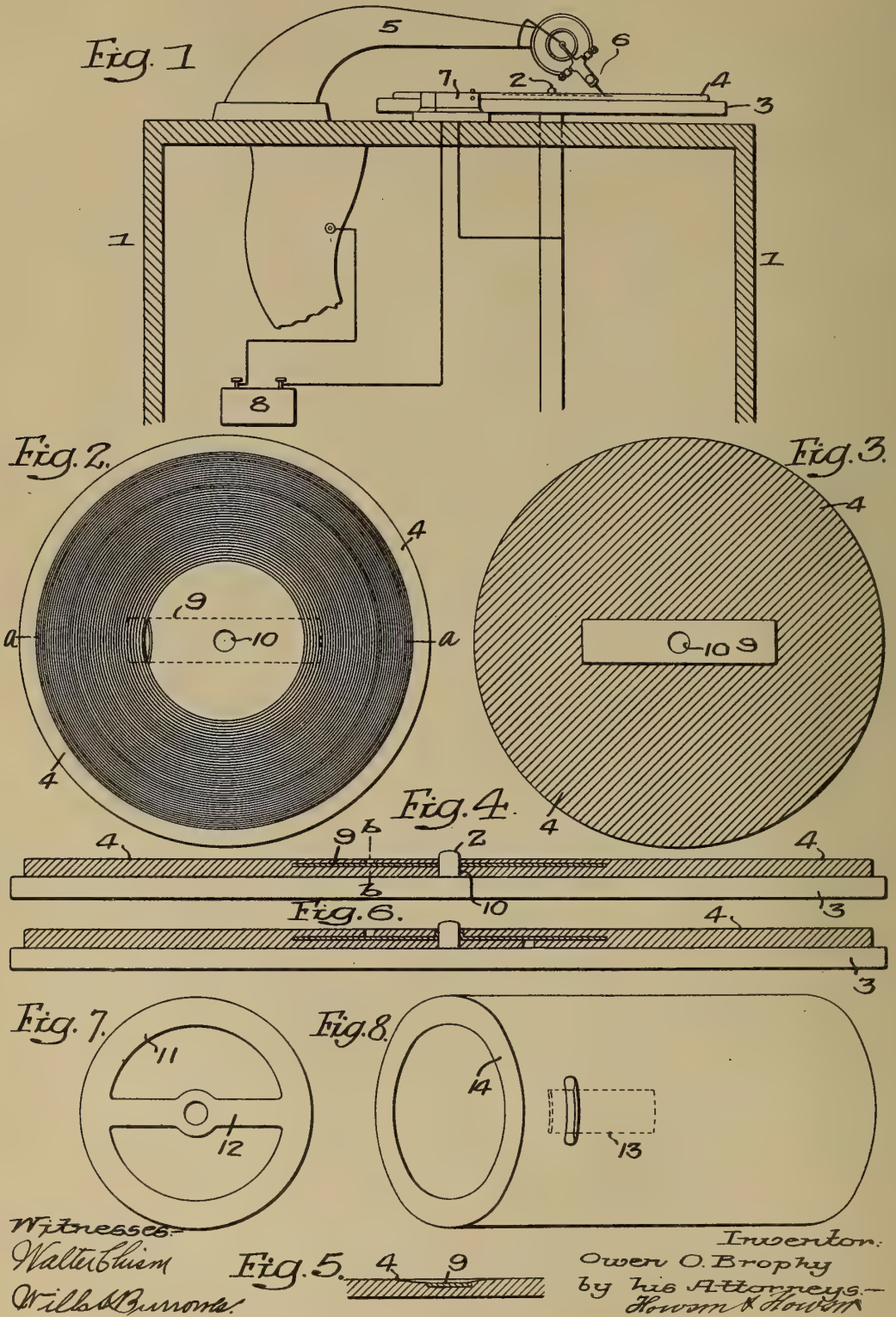
Patented-Jan. 26, 1915.

Filed    -Mar. 21, 1913.

O. O. BROPHY.  
 RECORD TABLET FOR TALKING MACHINES.  
 APPLICATION FILED MAR. 21, 1913.

1,126,377.

Patented Jan. 26, 1915.





# UNITED STATES PATENT OFFICE.

OWEN O. BROPHY, OF PHILADELPHIA, PENNSYLVANIA.

## RECORD-TABLET FOR TALKING-MACHINES.

1,126,377.

Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed March 21, 1913. Serial No. 755,944.

*To all whom it may concern:*

Be it known that I, OWEN O. BROPHY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Record-Tablets for Talking-Machines, of which the following is a specification.

One object of my invention is to provide means for automatically stopping a talking machine at the end of a record.

A further object of the invention is to locate an electric contact plate in the record tablet in such a manner that the formation of the record will not expose the plate; the plate being so arranged that it can be exposed at the end of the record.

A still further object of the invention is to so use such a record tablet that a phonographic machine in which a stylus is used may serve as one terminal of an electric circuit, and the post on which the record tablet is mounted will be the other terminal, such post being in electrical engagement with the contact plate when the record tablet is placed thereon.

These objects I attain in the following manner, reference being had to the accompanying drawing, in which:—

Figure 1, is a diagrammatic view of a talking machine of the disk type, illustrating my invention; Fig. 2, is a plan view of the phonographic record tablet, illustrating my invention; Fig. 3, is a sectional plan view of the record tablet, showing the contact plate in full lines; Fig. 4, is a transverse sectional view, on the line *a—*a**, Fig. 2, of the phonographic record tablet showing the contact plate embedded therein; Fig. 5, is a sectional view on the line *b—*b**, Fig. 4; Fig. 6, is a transverse sectional view of a double phonographic record tablet, showing the contact plate located midway between the sides; Fig. 7, is a view illustrating a modification of the contact plate; and Fig. 8, is a view of a record cylinder showing the contact plate in position therein.

Referring to the drawing, 1 is the casing of a talking machine of any suitable type.

2 is the post on which the rotating table 3 is mounted and resting on this table is the record tablet 4 of the disk type.

5 is the arm carrying the stylus 6 under which the record tablet travels, the stylus following the record grooves in said tablet.

7 is any suitable brake mechanism arranged to bear against the table 3 when it

is desired to stop the rotation of said table, and 8 is a battery connected, in the present instance, to the post 2 as one terminal and to the stylus 6 as the other terminal, as illustrated in Fig. 1.

The record tablet 4 is made in the ordinary manner with the exception that inserted in the body of the tablet is a metallic contact plate 9 having a hole 10 of the same diameter as the post. This hole has, preferably, a neat fit on the reduced end of the post 2, so as to form a continuation of the electric terminal. The plate 9 is located within the record tablet 4 sufficiently far below the surface thereof so that the formation of the record therein will not expose the contact plate. The contact plate can be exposed by making a deep cut 9<sup>a</sup> in the tablet at the end of the record groove. As the record tablet rotates under the stylus, the stylus follows the record groove and after this is discontinued, the stylus will drop into the deep groove 9<sup>a</sup> and rest directly on the contact plate 9, thus completing the circuit and applying the brake, indicated at 7, which stops the rotation of the table and the record tablet. The record tablet can then be removed from the table and another record tablet placed thereon and the stylus adjusted at the proper point.

In Fig. 4, a single record tablet is shown with the plate embedded on one face.

In Fig. 5, I have illustrated a double faced record tablet and in this instance the metallic plate 9 is placed midway between the two faces, so that while the formation of the record on either face will not expose the metal contact plate, the tablet can be cut to expose the plate on either side.

The form of the cut 9<sup>a</sup> may be varied according to the character of the plate, but I prefer to make the cut as illustrated in Fig. 5 and bevel the disk on each side of the exposed portion of the plate so as not to damage or destroy the stylus.

In Fig. 7, I have illustrated a modification of the contact plate, which may be used in place of the plate shown in Fig. 3. This plate has a ring section 11 and a cross member 12 having an opening therein to receive the end of the post so that the plate can be exposed immediately at the end of the record at any point above the ring section 11.

In Fig. 8, I have illustrated my invention as applied to a cylindrical record, in

which a plate 13 is embedded in the record 14.

I claim:—

- 5 1. A talking machine record having an isolated metallic plate embedded therein, said record having its surface recessed to expose said plate, and said plate having a contact surface independent of that exposed by recessing the record.
- 10 2. A double faced talking machine record tablet having a metallic contact plate embedded axially therein intermediate its two faces so that a portion of such plate may be exposed, by recessing either or both faces,
- 15 said plate being apertured centrally with respect to the tablet to form a contact surface independent of that exposed by recessing the record.
- 20 3. A talking machine record tablet having a central opening and a contact plate embedded in said tablet and having an opening in line with the central opening of the tablet whereby it may contact with the record driving post, said contact plate be-

ing inwardly disposed with respect to the record surface of the tablet and being exposed for engagement by the stylus by recessing the face of the record tablet at the end of the record groove.

4. A talking machine record tablet having a metallic contact plate centrally embedded therein, said tablet and plate being apertured for the reception of a post upon which it is to be mounted for rotation, whereby said post will make contact with the plate; the surface of said tablet being recessed to expose the contact plate at the end of the record groove and providing a contact independent of that engaging the post.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

OWEN O. BROPHY.

Witnesses

WM. E. SHUPE,

WM. A. BARR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH RECORD REPRODUCER.

# 1,126,382 -- D. W. Bryant,

Patented- Jan. 26, 1915.

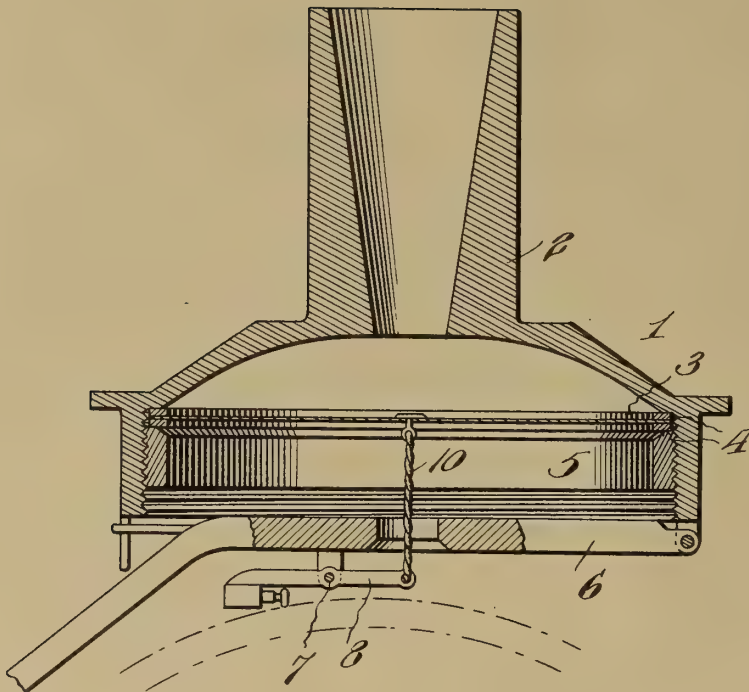
Filed - July 5, 1910.



D. W. BRYANT.  
PHONOGRAPH RECORD REPRODUCER.  
APPLICATION FILED JULY 5, 1910.

1,126,382.

Patented Jan. 26, 1915.



Witnesses  
*Frank Hough*  
*Chas. M. Bradley*

Inventor  
*Dalton W. Bryant*,  
By *Victor J. Evans*  
Attorney

# UNITED STATES PATENT OFFICE.

DALTON W. BRYANT, OF CARBONDALE, PENNSYLVANIA.

PHONOGRAPH-RECORD REPRODUCER.

1,126,382.

Specification of Letters Patent.

Patented Jan. 26, 1915.

Application filed July 5, 1910. Serial No. 570,444.

*To all whom it may concern:*

Be it known that I, DALTON W. BRYANT, a citizen of the United States, residing at Carbondale, in the county of Lackawanna and State of Pennsylvania, have invented new and useful Improvements in Phonograph-Record Reproducers, of which the following is a specification.

This invention relates to a sound reproducing device, such for instance, as a phonograph reproducer, and relates more particularly to a connecting means between the stylus arm and diaphragm.

The invention has for one of its objects to improve the construction and operation of devices of this character so that the life of the record will be materially prolonged, the reproduction of tones more accurately accomplished, and the usual screeching or scratching sounds eliminated.

Another object of the invention is to provide an improved link between the stylus arm and diaphragm which is flexible but non-elastic so that vibrations will be effectively transmitted from the record to the diaphragm without any objectionable defects present in those sound reproducing devices in which a steel link is employed.

In the reproducing of sounds by a sound reproducing device including a metal link between the stylus arm and diaphragm, by changing a note of high vibration to one of lower vibration, the vibration of the diaphragm does not conform precisely to the record so that the diaphragm is not in harmony with the stylus arm, and at the time of the transition from one note to the other an impulse, which may be termed a "kick back", is exerted on the stylus arm so that the stylus or sapphire thereof will dig into the record and produce wear on the latter and besides this the metal link will cause a rattling sound at the joints between it and the diaphragm and stylus arm.

With these objects in view, and others as will appear as the description proceeds, the invention comprises the various features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawing which illustrates one embodiment of the invention:—The figure is a central vertical section of a sound reproducing device used in connection with a cylinder record.

In the present instance I have elected to illustrate the invention as applied to a cylinder-record phonograph, but it is to be understood that it may be used in other sound reproducing devices.

Referring to the drawing, 1 designates the body or sound box of the reproducing device.

Amplifying means is connected by a nipple 2 to the box 1, and in the latter is a diaphragm 3 held between the gaskets 4 by a clamping ring 5 screwed into the box 1.

Hingedly mounted on the box 1 is a stylus carrier or weight 6, on which is fulcrumed, as at 7, a stylus arm 8. One end of the arm carries the stylus or sapphire that rides on the record. The opposite end of the stylus arm is connected with the center of the diaphragm by a flexible non-elastic element 10 comprising a link constituted by two strands twisted tightly together as clearly shown in the drawings. In practice, it has been found that a pliable material, such as silk or linen, is especially suitable for forming this connecting element. A link of silk, linen or the like permits the diaphragm to vibrate more in unison with the stylus arm and changing from one note to another is not accompanied by a kicking back or impulse on the stylus arm which injuriously affect the record, and furthermore the link does not emit a rattling sound as does the usual metallic link that has its ends connected with the stylus arm and diaphragm. A fiber link of the character described lasts for a considerable period and prolongs the life of the record.

From the foregoing description taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention relates, and while I have described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as are within the scope of the claims.

Applicant is aware of a link comprising a single strand between the stylus and diaphragm, but a particular efficacious result has been found to result from the use of a link composed of two strands twisted together.

Having thus described the invention what I claim as new is:—

1. In a sound reproducer, in combination with a diaphragm and stylus lever, of a connecting member therebetween comprising  
5 two twisted strands of flexible non-elastic material.

2. In a sound reproducer, in combination with a diaphragm and stylus lever, of a

connecting member therebetween comprising  
10 two twisted strands of flexible non-elastic fibrous material.

In testimony whereof I affix my signature in presence of two witnesses.

DALTON W. BRYANT.

Witnesses:

ISAAC ATUT,

SALVATORE PUGLIANO.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents.  
Washington, D. C."



SOUND RECORDING APPARATUS.

# 1,126,428 - T. A. Edison.

Patented-Jan. 26, 1915

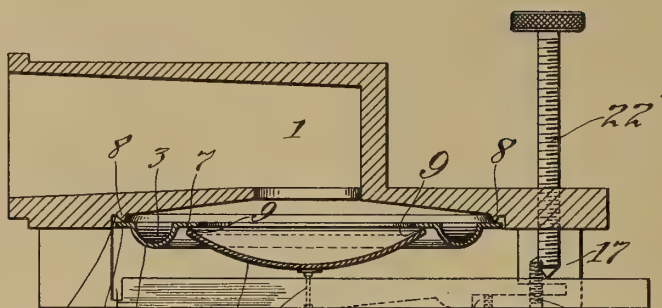
Filed -June 9, 1910

T. A. EDISON.  
SOUND RECORDING APPARATUS.  
APPLICATION FILED JUNE 9, 1910.

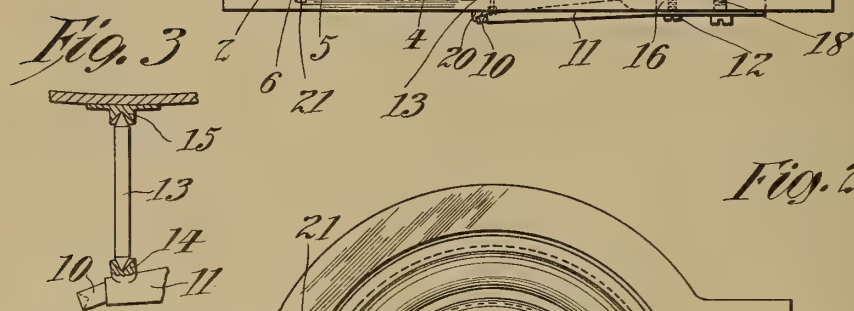
1,126,428.

Patented Jan. 26, 1915.

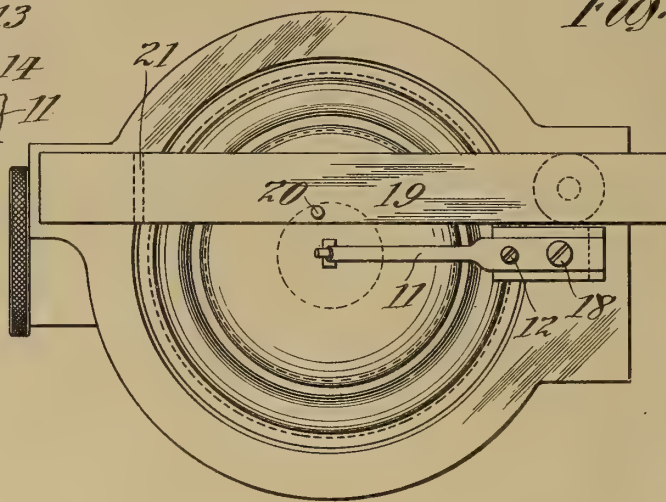
*Fig. 1*



*Fig. 3*



*Fig. 2*



*Witnesses:*  
Robert M. Sutphen.  
Dyer Smith

*Inventor:*  
Thomas A. Edison  
by Frank L. Owen  
His Atty.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR TO  
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION  
OF NEW JERSEY.

## SOUND-RECORDING APPARATUS.

1,126,428.

Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed June 9, 1910. Serial No. 566,069.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Sound-Recording Apparatus, of which the following is a description.

My invention relates to devices for recording sound, and is an improvement on the structure described in my application Serial No. 556,469, filed April 20, 1910, which application has resulted in United States Patent No. 1,019,441, dated March 5, 1912. In the application referred to was described and claimed a recorder having a diaphragm comprising a flexible ring having the upper surface of its outer edge resting in contact with a knife edge carried by the sound box, and a rigid arched circular central member, the outer edge of which constituted a knife edge and pressed against the lower side of the inner edge of the flexible ring. The stylus was rigidly connected with the center of the rigid inner diaphragm member, and a strong upward stress given to the whole diaphragm, by means of a spring member upon which the stylus was carried, to hold the members of the diaphragm in position and also to prevent excessive movement of the diaphragm away from the recording surface. This resulted in a construction of sufficient sensitiveness to respond to sound waves of little power, and one which also was so formed as to largely prevent excessive movements of the diaphragm away from the recording surface under the influence of sound waves of great amplitude.

The object of my present invention is to improve upon the construction just described.

I now propose to form the flexible ring member of the diaphragm of acetyl cellulose, or nitro-cellulose, or cellulose xanthate, (viscose cellulose), paper and like material whose porous structure permits of large flexing with very little power, a property absent in metals, glass and similar non-porous materials. I also now form the ring member with a wide central ring-shaped corrugation, the knife-edges of the sound box and the rigid central diaphragm member respectively contacting narrow flat portions of the ring member on each side of

the corrugation. By this means the action of the diaphragm is changed, so that, while the diaphragm is just as sensitive to weak sound waves of small amplitude, it is not moved away from the recording surface so far under the influence of sound waves of great amplitude. It is worthy of note that when such a corrugation is formed on a ring member made of metal of other substance having different properties from those of the materials mentioned, the vibrations of the same are deadened, so that no successful record can be made. Also by this construction, the possibility of buckling in the ring member is lessened, as is also the tendency of the flexible member to vibrate in parts. Another improvement, which is described and claimed herein, over the construction shown in my previous application, consists in making a jointed connection between the diaphragm and the spring lever carrying the stylus instead of connecting the parts rigidly. As the stylus moves up and down in recording, it also moves in an arc about the point at which the spring lever carrying the stylus is supported. If the stylus and spring lever are rigidly connected to the center of the diaphragm, the movement of the stylus in an arc tends to force the diaphragm to one side, or to cause the same to buckle. I overcome this difficulty, as stated, by making a jointed connection between the spring lever and the diaphragm, so that the latter may freely move in straight lines toward and away from the recording surface without being acted upon by any forces through the connection from the stylus tending to move it in any other direction.

In order that a clear understanding of my invention may be had, attention is hereby directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 represents a vertical central cross section through a sound recorder embodying one form of my invention; Fig. 2 is a bottom plan view thereof; and Fig. 3 is an enlarged detail view partly in section, showing my improved connection between the diaphragm and stylus.

Referring to the drawings, the sound box 1 may be provided with a recess 2 to receive and guide the diaphragm. The latter consists of a flexible outer portion 3 which is



preferably annular or ring-shaped, and an inner non-flexible portion 4. The flexible annulus 3 is preferably formed of a cellulose composition, such as paper, acetyl cellulose, nitro-cellulose, decomposed viscose cellulose, or other porous easily flexing material. The annulus 3 is likewise preferably provided with a wide stiffening corrugation 5 which may be either downwardly directed as shown or upwardly directed, and which occupies nearly the entire width of the ring, leaving very narrow flat portions 6 and 7 upon each side of the same. The flat portions as shown, are substantially narrower than the corrugation. The ring 3 is placed within recess 2 of sound box 1 without touching the sides of the same and is supported by knife edge 8 extending downwardly from sound box 1 within recess 2, said knife edge being positioned to engage the upper surface of the outer flat portion 6 of ring 3. The stiffening corrugation 5 extends outwardly nearly to knife edge 8 leaving a very narrow portion of the ring between the corrugation and the knife edge. The ring 3 is not secured to the sound box by wax, rubber, or in any other way. The rigid or non-flexible portion 4 of the diaphragm is given the form of an arch as shown, or is otherwise formed so that it will not be flexed by the vibrations of the sound waves upon it. This rigid member 4 is preferably circular in form with its edge bent sharply upward, as shown at 9, thus forming a knife edge contacting the lower side of the inner flat portion 7 of ring 3, quite near the inner edge of corrugation 5. The recording stylus 10 is carried by spring lever 11, the other end of which is flattened and secured within the sound box by screw 12.

In assembling the recorder, the ring member 3 of the diaphragm is placed in position upon knife edge 8 with the upper surface of flat portion 6 of the ring adjacent the outer edge of corrugation 5 contacting the same, and the non-flexing member 4 of the diaphragm is then placed in position with its sharp peripheral edge 9 contacting the under side of flat portion 7 of ring 3 near its inner edge, and also near the inner edge of corrugation 5. A small pin 13 having pointed or rounded ends is then placed in position between the end of spring member 11 and the center of the rigid diaphragm member 4, which are provided with conical or rounded holes or sockets 14 and 15 in which the ends of pin 13 rest, the spring member 11 being given a strong inward flexure, so that pin 13 and the diaphragm members are held in position, and a strong upward stress given to the whole diaphragm.

The construction described provides a pin and socket or universal connection between the stylus and diaphragm, so that as the

stylus moves in an arc about screw 12, the pin 13 will turn slightly in its sockets 14 and 15, without binding or buckling the diaphragm or otherwise affecting its straight line movement toward and away from the recording surface.

Instead of the universal connection described, I might pivot the pin 13 to the diaphragm and the spring lever 11 in such a manner as to permit relative movement of the pin only in a plane parallel to the axis of the spring lever 11, but the construction shown is simpler and better.

The amount of flexure of spring member 11 may be adjusted in any suitable manner. As shown in the drawings, I prefer to secure spring member 11 as by screw 12 to an arm 16 of block 17 secured to the sound box. Block 17 is formed of brass or other comparatively elastic material, and arm 16 may be moved somewhat toward or away from block 17 by adjusting screw 18, threaded through arm 16 and block 17, and thereby increasing or decreasing the initial flexure of spring member 11 carried by arm 16. Lever 19 carrying tracking member 20 may be used if desired, the lever and the tracking member 20 carried thereby being adjustable to regulate the depth of cut permissible for recording stylus 10. Lever 19 may be of comparatively elastic material, such as brass, cut away as shown at 21 to produce a flexible joint or hinge, the screw 22 bearing on the end of the lever to regulate the position of tracking member or ball 20.

Of the substances of which I have stated the ring member 3 may be formed, I prefer to use acetyl cellulose, since this material seems to hold its shape better than any other. Diaphragms well adapted to the desired purpose may, however, be formed of any of the substances named, while I have found that glass, mica, and metals are not adapted for this purpose.

Having now described my invention, what I claim and desire to protect by Letters Patent as follows:

1. In sound recording apparatus, the combination with a centrally stiffened ring diaphragm formed of flexible material and a non-flexible central member bridging the opening of the ring and in contact therewith, of a recording stylus connected to the non-flexible member, and means for applying an elastic pressure on the stylus to hold the flexible and non-flexible members in engagement, substantially as described.

2. In sound recording apparatus, the combination of a knife edge support, a two-part diaphragm comprising a stiffened ring member having a flexible outer edge freely mounted on said support with the latter contacting the flexible outer edge thereof and a non-flexible member bridging the opening of said ring and making contact therewith, a



recording stylus and a spring arm carrying the stylus and by its tension imposing an initial flexure on the diaphragm, substantially as described.

3. In a sound recording apparatus, the combination with a sound box, of a stiffened ring diaphragm having a flexible portion mounted in contact with said sound box, a non-flexible member mounted to contact said ring diaphragm, but not attached thereto, and a recording stylus connected to said non-flexible member, substantially as described.

4. In sound recording apparatus, the combination with a supporting knife edge, of a diaphragm comprising a ring of flexible material having outer and inner flat portions adjacent its outer and inner edges respectively, and a corrugated portion intermediate said flat portions, said outer flat portion bearing on said knife edge, a non-flexible member mounted with its outer edge contacting said inner flat portion but not attached thereto, and a stylus connected to said non-flexible member, substantially as described.

5. In sound recording apparatus, the combination with a recording stylus, of a diaphragm connected thereto comprising a rigid inner portion and an outer portion mounted to vibrate therewith, and formed of acetyl cellulose, substantially as described.

6. In apparatus of the class described, the combination with a stylus, of a diaphragm connected thereto comprising a rigid inner portion and an outer ring portion mounted to vibrate therewith, but not attached thereto, said outer ring portion being formed of a flexible porous organic material with a central ring-shaped corrugation therein, and means for supporting said diaphragm contacting said ring portion outside of said corrugation, substantially as described.

7. In apparatus of the class described, the combination with a stylus, of a diaphragm connected thereto and comprising a rigid inner portion and an outer portion formed of flexible material and having central stiffening means, a knife edge contacting the upper surface of the outer portion on one side of said stiffening means, said rigid inner portion having a sharp outer edge contacting the under surface of said outer portion on the side of said stiffening means opposite that contacted by said knife edge, and elastic means for holding said inner portion in contact with said outer portion, substantially as described.

8. In sound recording apparatus, the combination with a sound box, of a stiffened

diaphragm member mounted therein but not secured thereto and having flexible free edges, a non-flexible diaphragm member mounted to vibrate with said stiffened diaphragm member but not secured thereto, and a stylus connected to said non-flexible diaphragm member, substantially as described.

9. In sound recording apparatus, the combination with a recording stylus and a yielding member carrying the same, of a diaphragm and a connection between said member and diaphragm having universal movement with respect to said member and diaphragm, said yielding member normally exerting a pressure on said connection to force the same toward said diaphragm, substantially as described.

10. In sound recording apparatus, the combination with a sound box, of a flexible ring diaphragm mounted therein, said diaphragm having an annular corrugation therein and being formed of a compound of cellulose, a non-flexible member mounted to contact one edge of said ring but not secured thereto, and a recording stylus connected to said non-flexible member, substantially as described.

11. In sound recording apparatus, the combination with a sound box, of a stiff corrugated annular diaphragm member mounted therein but not secured thereto and having a free flexible inner edge, a support engaging said member adjacent its inner edge but not secured thereto, and a stylus connected to said support and adapted to vibrate with said diaphragm member, substantially as described.

12. As a new article of manufacture, an annular diaphragm of acetyl cellulose, substantially as described.

13. As a new article of manufacture, an annular flexible diaphragm of acetyl cellulose formed with a concentric annular stiffening corrugation and flat portions on the inside and the outside of the same, substantially as described.

14. In sound recording apparatus, the combination with a recording stylus and a resilient member carrying the same, of a diaphragm, and connecting means having a universal connection with said resilient member and also with said diaphragm, substantially as described.

This specification signed and witnessed this 7th day of June 1910.

THOS. A. EDISON.

Witnesses:

DYER SMITH,  
J. M. CANFIELD.





PHONOGRAPH.

# 1,126,703 - P. Catucci,

Patented-Feb. 2, 1915.

Filed -May 15, 1912.

P. CATUCCI.

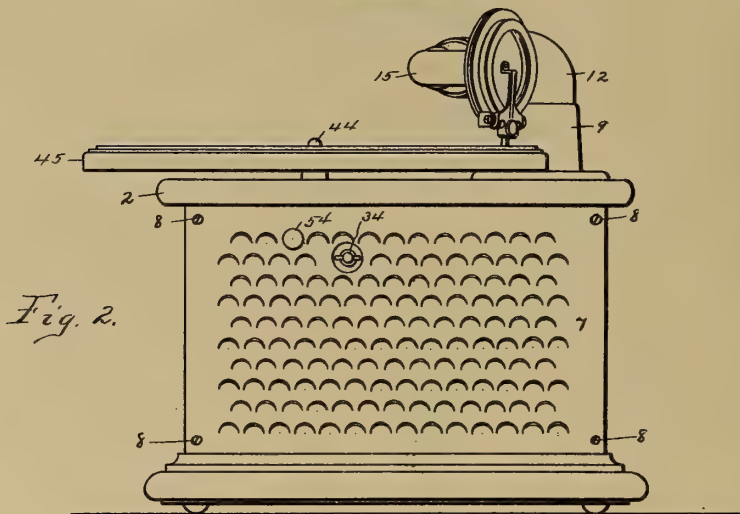
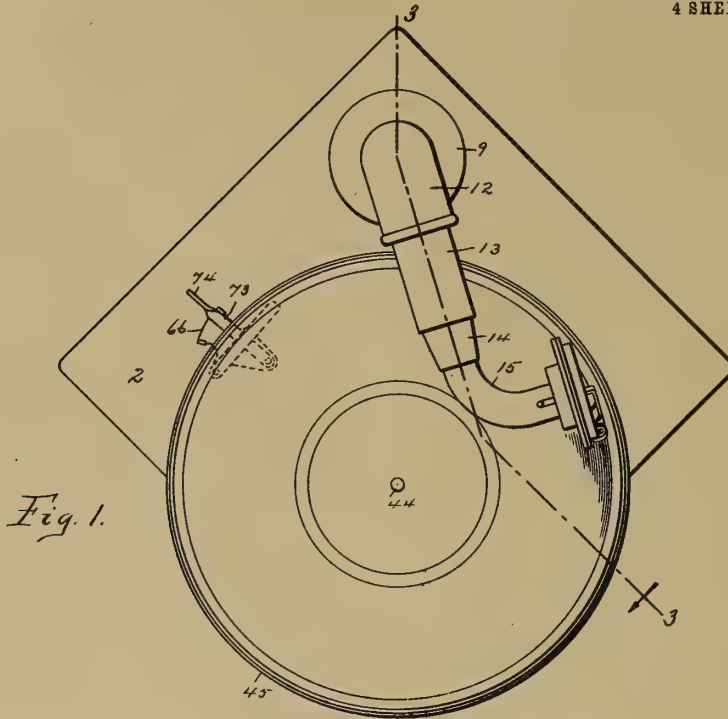
PHONOGRAPH.

APPLICATION FILED MAY 15, 1912.

1,126,703.

Patented Feb. 2, 1915.

4 SHEETS—SHEET 1.



Witnesses:  
Louis Sanders  
William B. Palmer

Pliny Catucci Inventor  
By *Louis M. Sanders* Attorney









P. CATUCCI.  
 PHONOGRAPH.  
 APPLICATION FILED MAY 15, 1912.

1,126,703.

Patented Feb. 2, 1915.

4 SHEETS-SHEET 3.

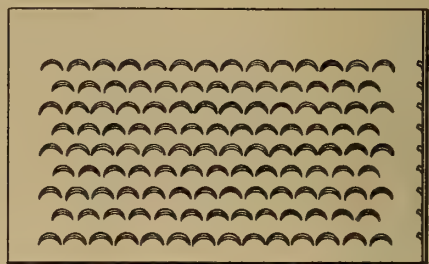
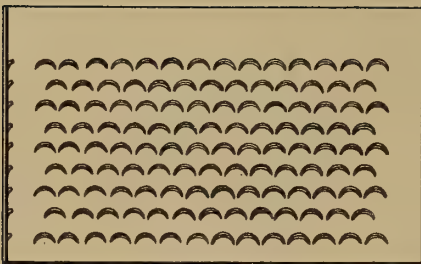
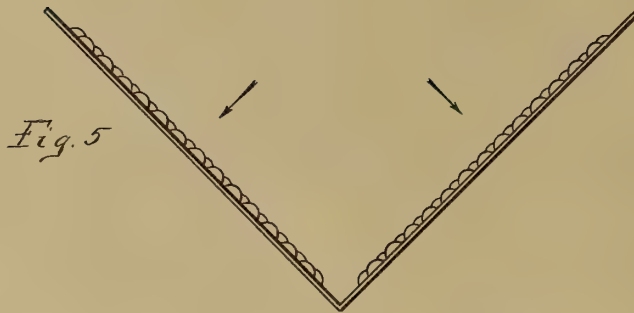


Fig. 6

Fig. 7

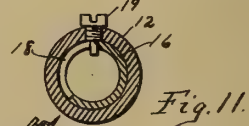
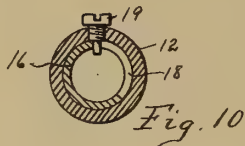
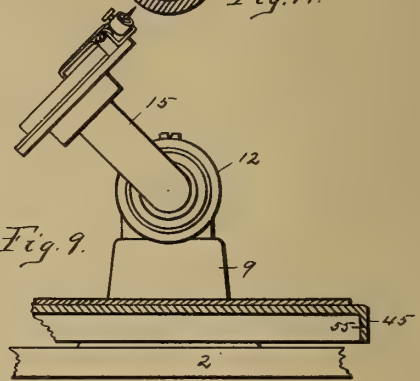
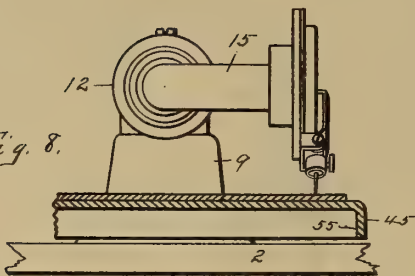


Fig. 8

Fig. 9



Attest:  
 Louis Sanders Jr.  
 William B. Palmer

Pliny Catucci Inventor:  
 by Louis M. Sanders Atty



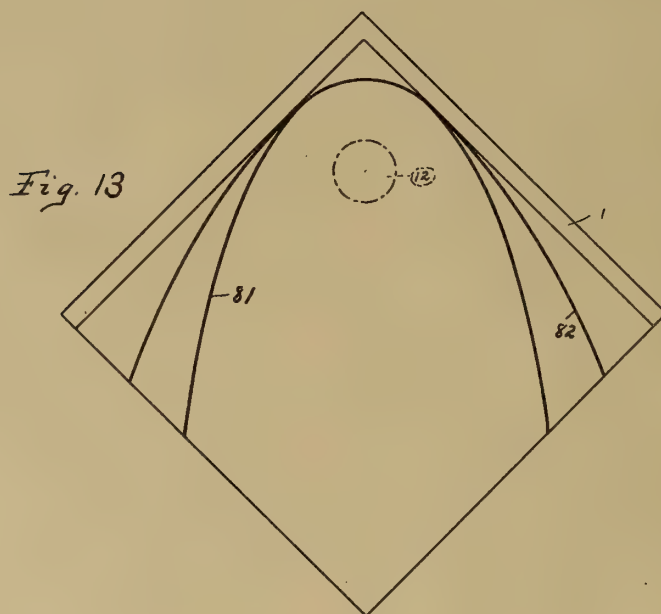
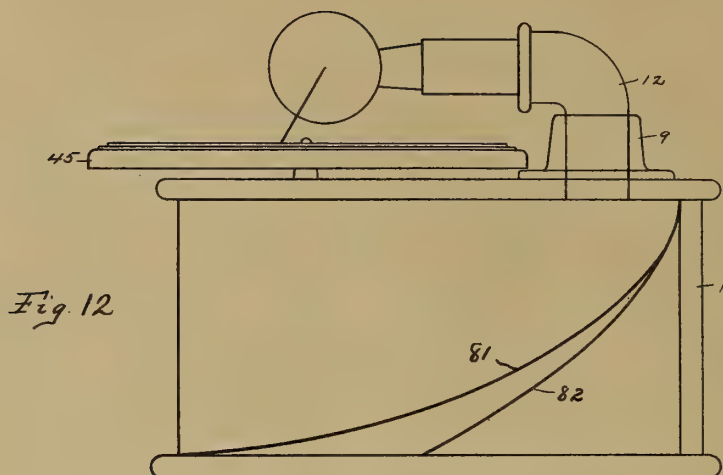


P. CATUCCI.  
PHONOGRAPH.  
APPLICATION FILED MAY 15, 1912.

1,126,703.

Patented Feb. 2, 1915.

4 SHEETS—SHEET 4.



Witnesses:  
Louis Sanders Jr.  
William B. Palmer

Pliny Catucci Inventor  
By *Louis M. Sanders* Attorney

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MIESSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,126,703.

Specification of Letters Patent. Patented Feb. 2, 1915.

Application filed May 15, 1912. Serial No. 697,426.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

The prime object of my invention is to so construct the case of a phonograph as to provide in itself sound amplifying means without special adaptation of the sound conductor or so called horn.

In phonographs of the disk type, as at the present day constructed, it is the practice either to lead a sound conductor or tube from the reproducer to an external sound amplifying horn or lead such tube to the upper face of the case, and thence construct within the case a more or less distorted funnel shaped sound amplifier, the degree of distortion depending of course upon the space within this case after the motor and other operating parts have been provided for. After a series of exhaustive experiments, I have found that the case itself, without material modification, might be utilized as a sound amplifying device so that the distorted amplifier, above referred to, may be wholly dispensed with and a simple deflector of metal, wood fiber, or other suitable material may be located adjacent to the exit of the sound waves from the conductor when substantially the same results and even in some cases better results have been obtained than by the old form of structure. I have also discovered that the use of reflectors, constructed upon the mathematical principle of the conic section gives far better results than it is possible to obtain by means of the old form of horn, either of the external or internal type. These conic section reflectors may be semi-elliptical, parabolic, or hyperbolic, or in some cases they may be semi-spherical, depending of course upon the degree of concentration and directness with which the sound waves should be delivered from the machine. Of course it is to be understood that with the conic section form of sound reflector, the sound from the conductor must be delivered at the focus of the reflector whence it may radiate to the face of the reflector and thence be deflected in the proper direction in accordance with the particular form of reflector used.

In carrying out my invention, I make use of the structures illustrated in the accompanying drawings, and described in detail in the following specification.

Figure 1 is a plan view of the complete phonograph. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical section on line 3—3 of Fig. 1. Fig. 4 is a horizontal section through line 4—4 of Fig. 3. Fig. 5 is a detached plan view of the perforated side cover of the case. Fig. 6 is an inside elevation of one section of the cover. Fig. 7 is an outside elevation of the same. Fig. 8 is an end view of the sound box and conductor in playing position. Fig. 9 is a similar section view but with the sound box reversed or elevated for the purpose of replacing the stylus needle. Figs. 10 and 11 are vertical cross sections on line 10, 11 of Fig. 3, showing the two positions of the sound box tube. Figs. 12 and 13, show diagrammatically curved deflectors.

Similar reference numerals refer to like parts throughout the specifications and drawings.

The case 1 of the phonograph is of the usual rectangular form and is illustrated in the drawings as having the cover 2, bottom 3, and two sides 4 and 5. I also provide a single support post 6, as shown in Fig. 4, for the purpose of supporting the overhanging angle of the cover and connecting the same to the bottom, so as to render the case rigid. The two remaining sides of the case may either be left open entirely or they may be covered with a perforated sheet of metal 7, bent in the middle at a right angle to conform to the shape of the case, the extreme ends of this sheet of metal may be secured to the sides 4 and 5 by the screws 8. This sheet of metal, for the purpose of permitting the free exit of the sound waves emanating from the sound box, may be perforated in any suitable or desired design, but I have found that the stamping of semi-circular or crescent cuts through the material pressing the same inwardly, as shown in several of the drawings, gives very good results and does not materially muffle the sound. This perforated cover 7 may be made of wood, wood veneer, sheet metal, sheet fiber, vulcanized rubber, or any material from which it can be cheaply and readily made, or molded to conform to the contour of the case substantially as shown.



The sound box and sound conveyer tube may be of any usual or preferred type, as for example, such as are illustrated in my prior patent applications, Ser. Nos. 693,352 and 693,353, or the conveyer tube itself may be constructed as illustrated in Fig. 3 and several of the other figures. In this case, I provide the tubular standard 9 secured to the cover of the case in any convenient manner, but preferably in one corner of the cover as illustrated in Figs. 1 and 3. The interior of this standard is provided with the upper and lower bearings 10 and 11 for the vertical portion of the elbow 12, so that said elbow may freely revolve or oscillate within said bearings. Projecting forward from the elbow 12 is the supporting tube from the outer end of which projects the tapering bearing section 14. Extending within the horizontal parts, as thus described, is the sound box tube section 15 to the inner end of which is coupled the bearing section 16, the diameter of the latter being such as to nicely fit the horizontal section of the elbow, 12. The sections 15 and 16 may be secured together in any convenient manner so as to be substantially rigid, as for example, by means of the rivet 17. The inner section 16 is provided with a circumferential slot 18 into which extends the reduced end of the screw 19, which latter is screw threaded into the horizontal section of the elbow 12, the purpose of which is to axially limit the oscillations of the tube section 15 and 16.

From an inspection of Figs. 8, 9, 10 and 11, it will be seen that the sound box with the elbow tube 15, may be swung into the playing position shown in Fig. 8, or it may be swung into the upper position shown in Fig. 9, in which latter position the needle of the sound box may be replaced. In practice, when the needle rests upon the surface of the record, the tube 16 will be in the position shown in section in Fig. 10, with the slot 18, just out of contact with the point of the screw 19, so that the overhanging weight of the offset sound box will cause the needle to bear with requisite pressure upon the face of the record and yet follow the irregularities of the record, due either to the warping of the same or the uneven running of the tablet support or turn-table, 45. In the position shown in Fig. 8, the sound box is free to rise and fall with such irregularities of movement without interference between the point of the screw 19, and the end of the slot 18. The opposite end of the slot 18 serves to limit the oscillation of the sound box 15 in the opposite direction.

The sound box tube 15, and its extension 16, may be considered as one tube, but for manufacturing purposes may be made in the two section 15 and 16, riveted together by means of the rivet 17. The horizontal portion of the tone arm or elbow 12, permits

the free end of the sound box tube 15, to swing in the arc of a horizontal circle, parallel to the plane of the tablet support 45.

The record tablet support 45, is detachably mounted upon the upper end of shaft 44. This support consists simply of a disk of metal pressed to shape with the overhanging flange 55.

66 is a brake plate secured to the top of the case upon which the pivoted lever 73 is mounted, said lever having a finger piece 74, at its free extremity. By the use of this brake lever 73, the rotation of the record tablet support 45 may be quickly stopped.

From the description of the sound conductor tube, above referred to, in connection with Fig. 3 of the drawings, it will be noted that the tube proper terminates at the lower side of the cover 2 of the case, thus the sound waves are projected into the open space within the case and are not as has hitherto been the case conducted within confined walls to the open atmosphere. The projection of the sound waves into the open case now requires some means by which they may be deflected or reflected into the open atmosphere. I have, as hitherto indicated, provided several means for so deflecting or reflecting the sound waves, all of which means embody the same principle, which is the employment of a curved surface of revolution of some one of the conic sections, as for example, the circle, the ellipse, the parabola, or the hyperbola—that is to say, the surface of a sphere, an ellipsoid, a paraboloid or an hyperboloid. In practice however, I use a half conic section inasmuch as to use the whole conic section of revolution would too materially enlarge the case. As shown in Fig. 3, the dotted curved line within the case illustrates the section which such a reflector may take and may diagrammatically represent any one of the conic sections with the exit from the sound conductor elbow 12 located substantially at the focus of the conic section. I thus employ one of the well known principles of the concentration of sound by means of a reflector so placed as to direct the sound to the open atmosphere and gain the largest and best results.

In practice, I find it somewhat difficult and expensive to construct conic section deflectors for the cheaper grade of instruments and to take advantage of the principle and secure the best results within reasonable limits, I obtain very admirable sound effects from using a simple plane deflector 80 locating the same in the corner of the case, as illustrated in Figs. 3 and 4 with its upper face lying in a plane tangent to the theoretically correct conic section curve. This may be a piece of plane wood properly shaped to fit the corner, or it may be constructed of fiber, metal, rubber, papier mâché, or any suitable material either with



or without inherent resonant qualities. This particular form of deflector, however, I have made the subject-matter of my divisional Patent #1,067,405.

5 It might be thought that the location of the motor within the path of the sound waves from the reflector amplifier, would interfere with the clearness of the same, or that the slight noise or rattle of the same  
10 would interfere with the sound waves coming from the record. This however, is not the case, and in practice there seems to be no interference whatsoever even though the motor is located in substantially the direct  
15 line of the sound. In order however, to protect the motor from the access to dust and dirt and the like, which may be floating in the atmosphere, I may provide a cover  
20 for the same such cover completely enclosing the motor against the under side of the cover of the case.

I do not wish it considered or understood that I regard the various forms of conic sections to be utilized for the sound amplifying device to be modifications, as they are  
25 different forms for accomplishing slightly varying results. For example, phonographs of various grades are manufactured and put upon the market. The high grade and expensive instrument will warrant the instal-  
30 lations of the most perfect type of conic section deflector, while the expense of such a deflector in the low grade instrument would be prohibitive, and yet there is a  
35 wider market for a low grade instrument. I make use of the deflector board 80 as illustrated in Fig. 3 locating the plane of the same in the tangent to the theoretically correct conic section. It will thus be seen that  
40 I accomplish, by the structure in the drawings as described above, all of the objects and purposes originally set out, and that the resulting structure is an instrument  
45 which may vary through all of the regular manufacturing grades.

In Figs. 12 and 13, I have shown diagrammatically, the location of the parabolic reflector as at 81, and the hyperbolic reflector as at 82, with the exit for the sound waves  
50 from the conveyer 12, as located at the focus of the curves.

I claim:

1. In a phonograph, a rectangular box or case, means for conveying sound waves to  
55 the interior of said case at one corner of its top, and sound amplifying means comprising the under face of the top of said case and a sound reflector within said case and extending into the corner thereof adjacent  
60 to the point where the sound waves enter the interior of said case, the surface of said reflector being one half of the surface generated by the revolution of a conic section.

2. In a phonograph, a rectangular case  
65 open on two of its adjacent sides and closed

upon its top, bottom and two remaining sides, means for conveying sound waves to the interior of said case through one corner of the top thereof adjacent to the angle between said closed sides, and sound amplifying means comprising the under face of the top of said case and a sound reflector located in said case and extending into the angle between said closed sides adjacent to the point where the sound waves  
70 enter said case, said reflector being one half the surface generated by the revolution of a conic section.

3. In a phonograph, a rectangular case open upon two adjacent sides and closed  
80 upon its top, bottom and two remaining sides, means for conveying sound waves to the interior of said case through one corner of the top thereof, and sound amplifying means comprising the under face of the top  
85 of said case and a sound reflector located within said case and extending into the angle between its two closed sides adjacent to the point where the sound waves enter said case, said sound reflector being one  
90 half the surface generated by the revolution of a conic section and having the focus of said surface located at a point where said sound waves enter said case.

4. In a phonograph, a supporting case, a  
95 sound conveyer tube pivotally mounted upon one corner of said case and communicating with the interior thereof, and sound amplifying means comprising the under face of the top of said case and a sound reflector  
100 located within said case, said reflector being one half the surface generated by the revolution of a conic section and having the focus of said surface coincident with the under face of the top of said case and lo-  
105 cated at the point where the sound waves enter said case.

5. In a phonograph, a rectangular box or case having means for conveying sound waves to the interior of said case at one  
110 corner of its top, and sound amplifying means comprising the under face of the top of said case and a sound reflector having one half the surface of a paraboloid extending into the interior of said case with the  
115 focus of said paraboloid located at the point where the sound waves enter the interior of said case.

6. In a phonograph, a rectangular case open upon two adjacent sides and closed at  
120 its top, bottom and two remaining sides, means for conveying sound waves to the interior of said case through one corner of the top thereof, and sound amplifying means comprising the under face of the top of said  
125 case and a sound reflector located within said case and extending into the angle between its two closed sides, said reflector being one half the surface of a paraboloid with the focus thereof coincident with the  
130

point where the sound waves enter the interior of said case.

7. In a phonograph, a rectangular box or case having means for conveying sound waves to the interior of said case at one corner of its top, and sound amplifying means comprising the under face of the top of said case and a sound reflector within said case, said reflector being one half the surface of a paraboloid and having the focus thereof coincident with the under face of said top at the point where the sound waves enter the interior of said case.

8. In a phonograph, a rectangular case open upon two adjacent sides and closed at its top, bottom and two remaining sides, means for conveying sound waves to the interior of said case through one corner of its top, and sound amplifying means comprising the under face of the top of said case and a sound reflector located within said case and extending into the angle between its two closed sides, said reflector being one half the surface of a paraboloid and having the focus thereof coincident with the under face of said case.

9. In a talking machine, the combination of a tubular tone arm normally extending toward the record to be played and pivoted to swing in a horizontal plane, a sound box tube having a rectangular bend therein, one arm of which tube is inserted into said tone arm to permit the other arm of said tube to oscillate in a vertical plane, and means

for permitting a free but limited oscillation of said sound box tube around the axis of said tone arm.

10. In a talking machine, the combination of a tubular tone arm normally extending toward the record to be played and adapted to swing in a horizontal plane, a sound box tube inserted into the free end of, and in axial alinement with said tubular tone arm, said sound box tube having a rectangular bend therein near its free end, and means upon said tone arm and said sound box tube for permitting a free but limited oscillation of said sound box tube around the axis of said tone arm.

11. In a talking machine, the combination of a tubular tone arm normally extending toward the record to be played and adapted to swing in a horizontal plane, a sound box tube inserted into the free end of said tone arm and in axial alinement therewith, a circumferential slot in said sound box tube, and a screw pin inserted into said tone arm for engagement with said slot whereby said sound box tube may have a free but limited axial oscillation within said tone arm.

In testimony whereof I have hereunto set my hand this 10th day May, 1912.

PLINY CATUCCI.

Witnesses:

NORMAN E. ZUSI,

AUGUST F. MEISSELBACH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."



PHONOGRAPH PATENTS.

MOTOR DRIVEN PHONOGRAPH,

# 1,127,056 -- A. F. Madden,

Patented-Feb. 2, 1915.

Filed -July 7, 1914.

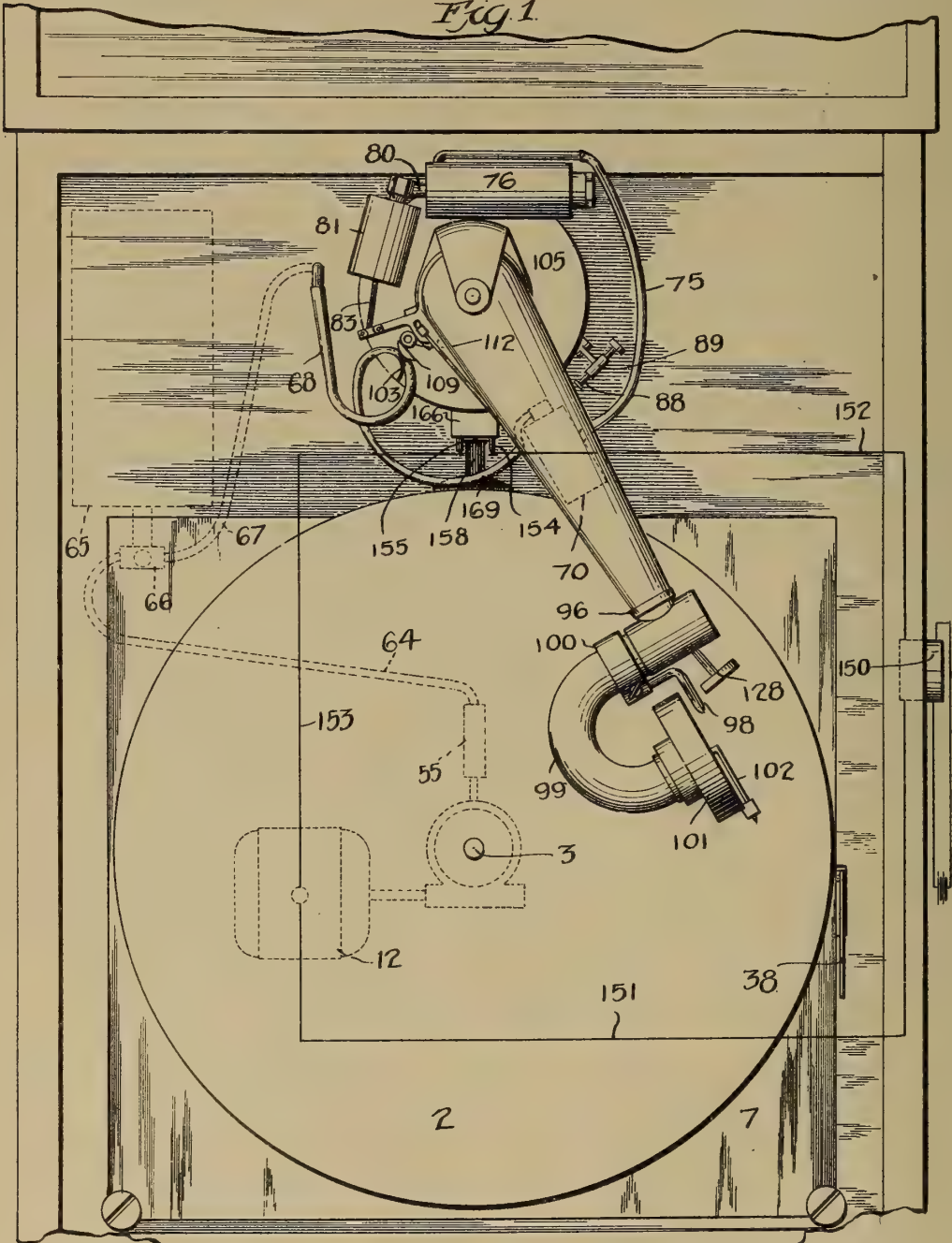
A. F. MADDEN.  
MOTOR DRIVEN PHONOGRAPH.  
APPLICATION FILED JULY 7, 1914.

1,127,056.

Patented Feb. 2, 1915.

5 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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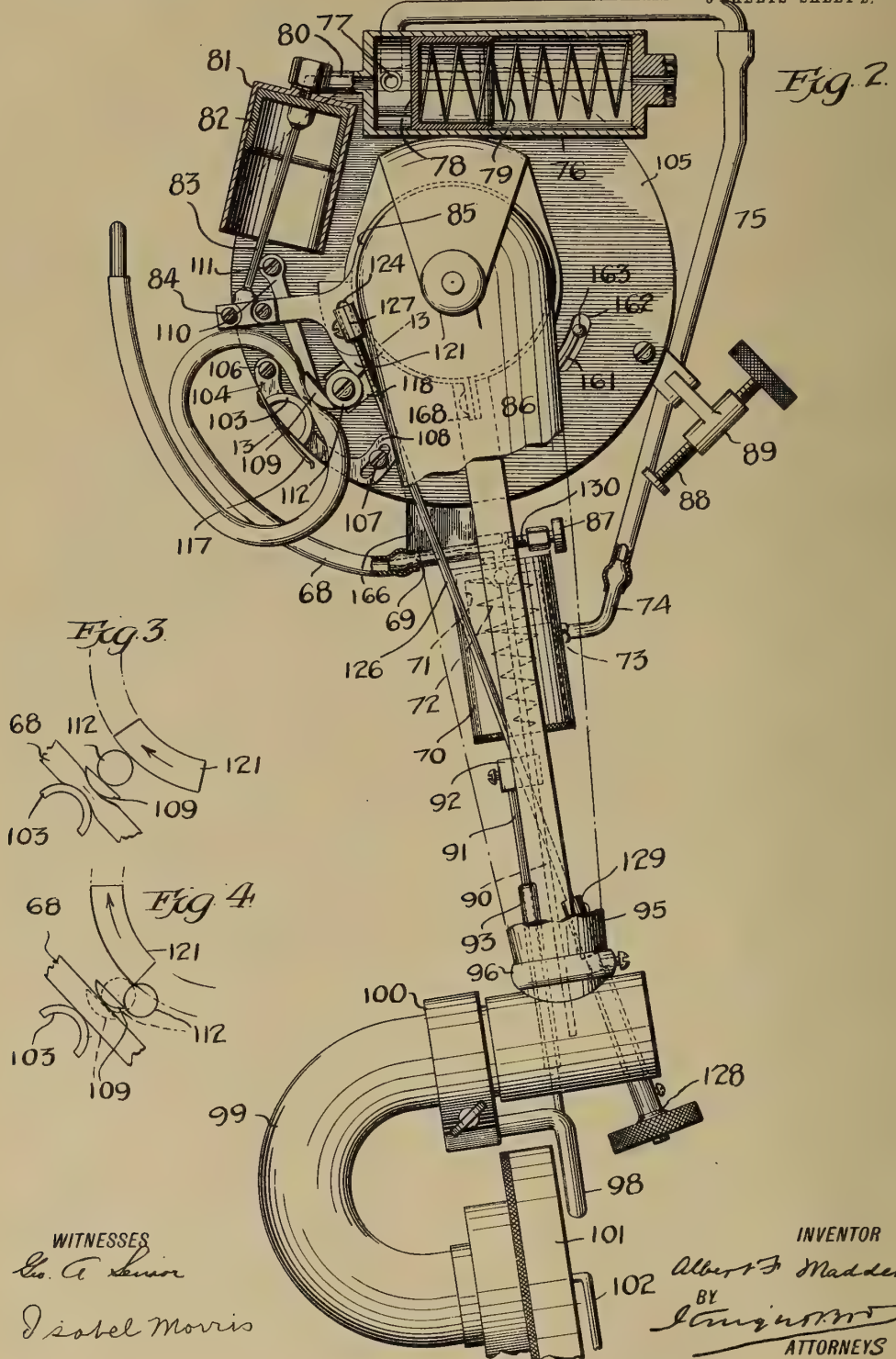


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MOTOR DRIVEN PHONOGRAPH.  
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6 SHEETS-SHEET 2.



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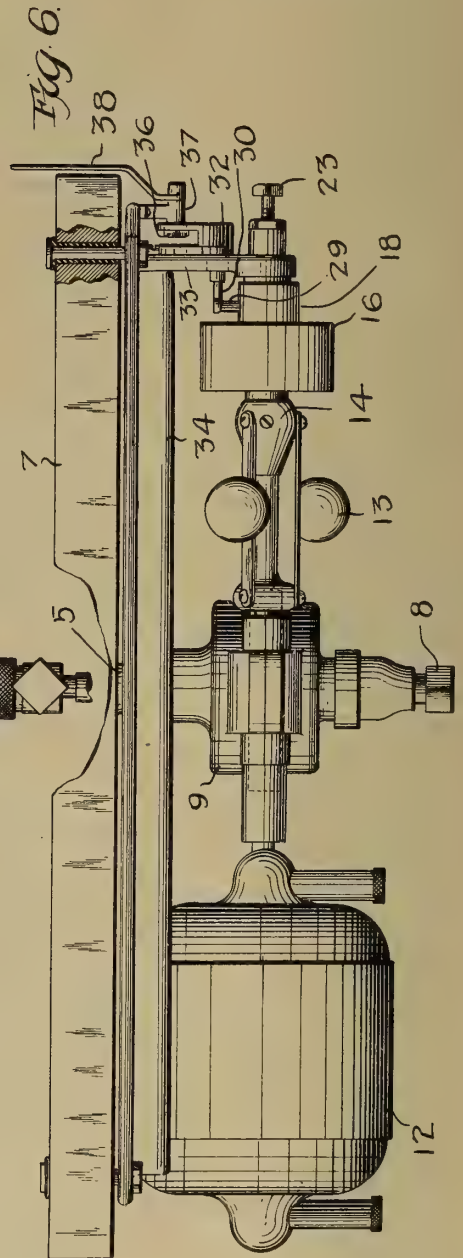
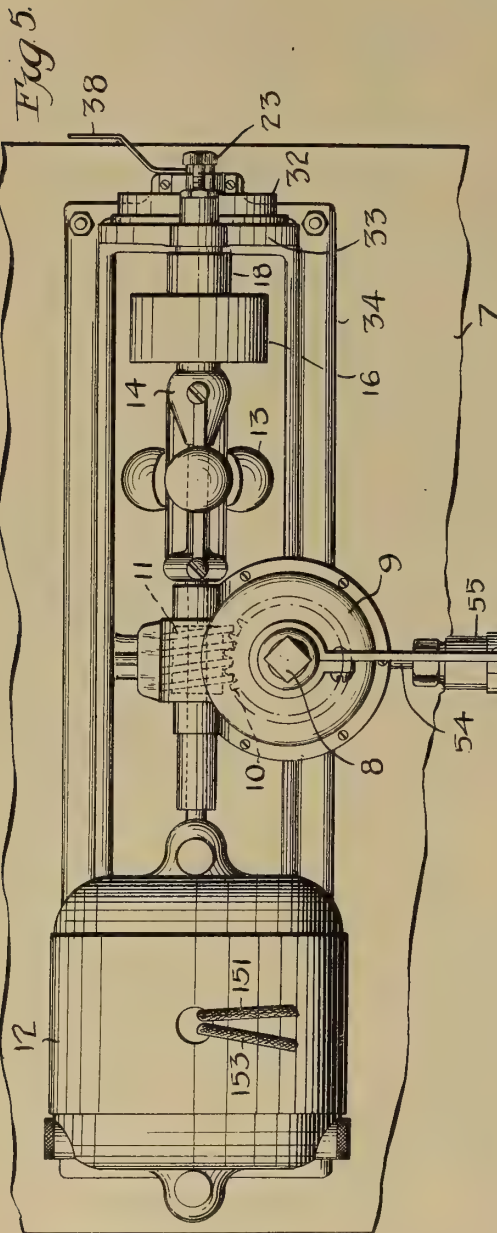


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5 SHEETS—SHEET 3.



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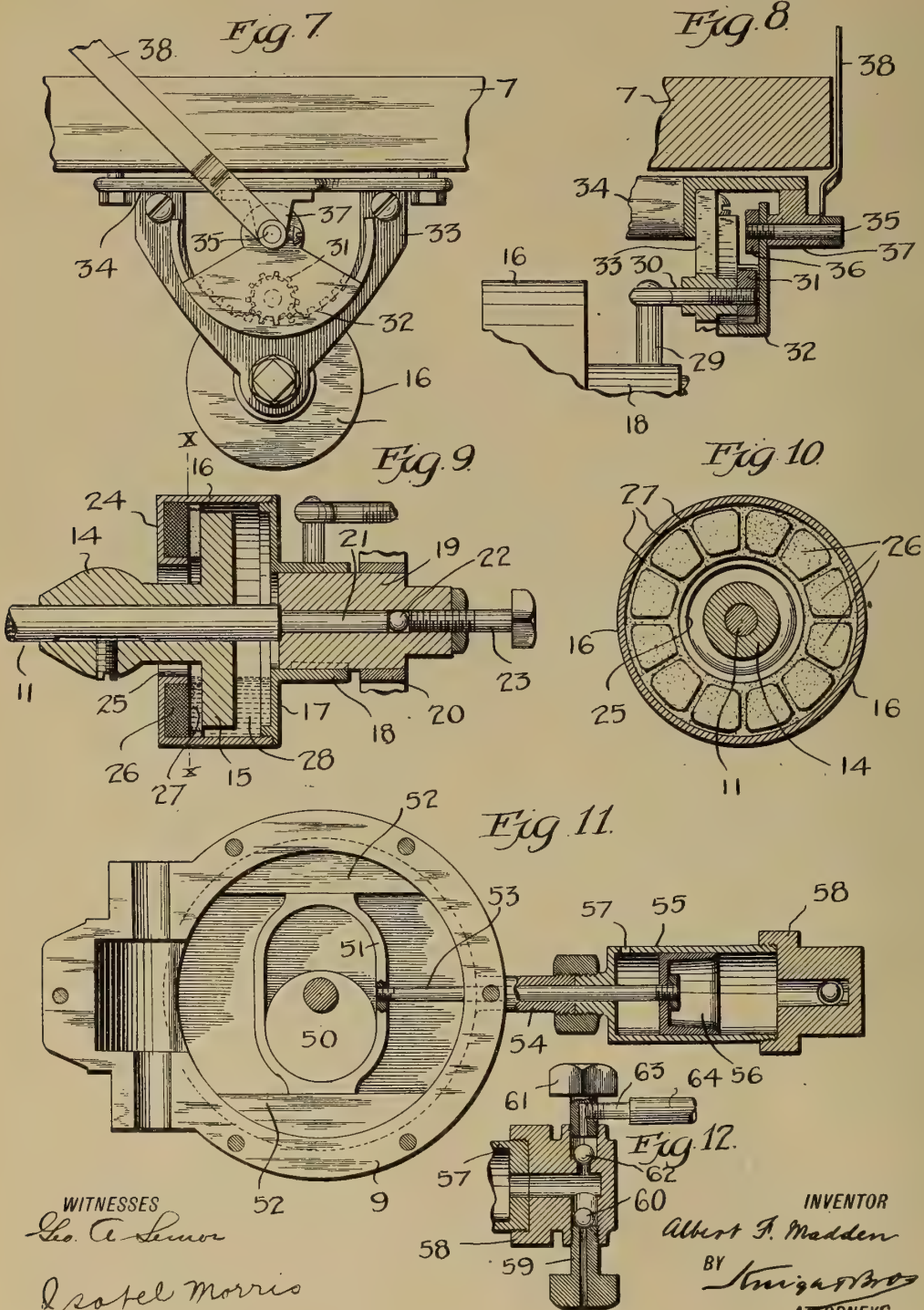


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MOTOR DRIVEN PHONOGRAPH.  
APPLICATION FILED JULY 7, 1914.

1,127,056.

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5 SHEETS—SHEET 4.



WITNESSES  
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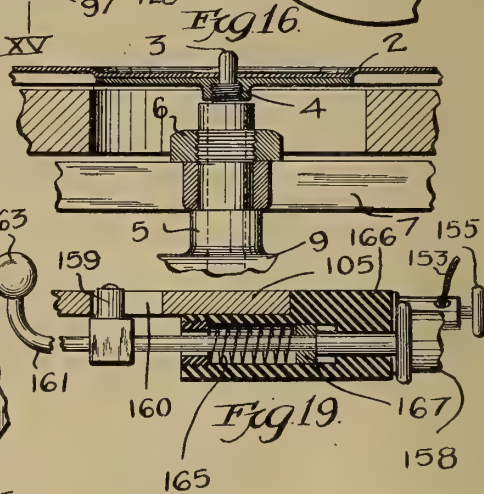
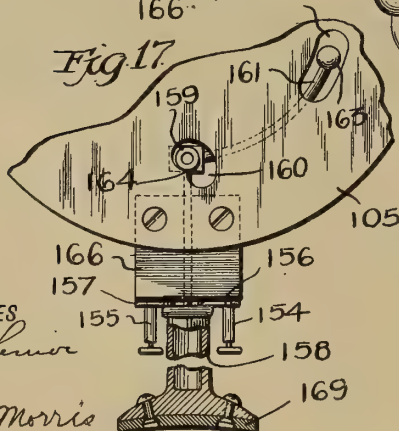
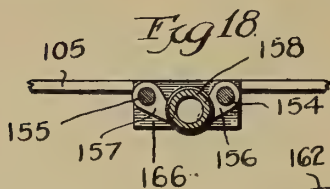
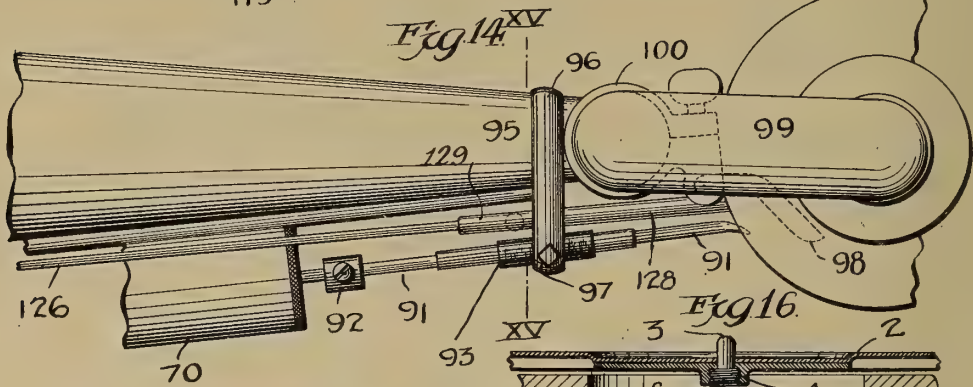
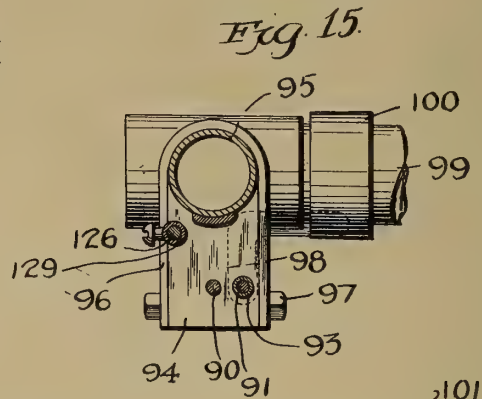
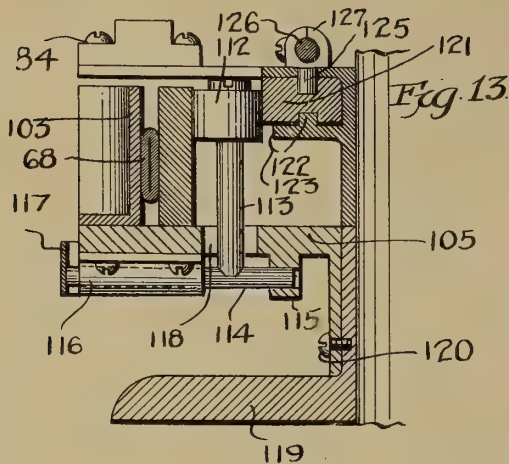


A. F. MADDEN.  
MOTOR DRIVEN PHONOGRAPH.  
APPLICATION FILED JULY 7, 1914.

1,127,056.

Patented Feb. 2, 1915.

5 SHEETS-SHEET 5.



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# UNITED STATES PATENT OFFICE.

ALBERT F. MADDEN, OF NEWARK, NEW JERSEY.

## MOTOR-DRIVEN PHONOGRAPH.

1,127,056.

Specification of Letters Patent.

Patented Feb. 2, 1915.

Application filed July 7, 1914. Serial No. 849,432.

*To all whom it may concern:*

Be it known that I, ALBERT F. MADDEN, a citizen of the United States, residing in the city of Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Motor-Driven Phonographs, of which the following is a full and clear specification.

My invention relates in general to phonographs of the disk type and more especially to motor driven phonographs in which mechanism is provided for automatically stopping and repeating the reproduction.

In order to indefinitely repeat the reproductions on phonographs, it is desirable that some form of power drive be employed which is continuous in its operation, that is to say, to avoid the necessity of intermittent winding or storing of power in the drive mechanism as takes place in the usual spring motor driven phonographs. Power is also necessary to actuate the repeating mechanisms. The term "motor" as employed herein, is intended to indicate a power motor, preferably electric, to distinguish the driving means from the usual spring power drive mechanism in which the energy is stored by a manual operation in the act of winding.

It has heretofore been proposed to employ the electric motor for driving phonographs. Due to the variation in line voltage which is usually experienced in the operation of electric motors, considerable difficulty has been met in applying the electric motor drive to phonographs. The pitch of the tone reproduced by the phonograph, is of course under the direct influence of the speed at which the record is driven, and the slightest perceptible variation in the speed of the record interferes with the quality of the reproduction. It will therefore be apparent that the success of a repeating phonograph depends in a large measure upon the proper control of the driving mechanism employed and that the use of an electric motor can be practicable only when accompanied by a positive and reliable speed control for the motor.

According to my invention I employ preferably an electric motor in conjunction with a reliable governor of special design, and this source of power is utilized for the driving of the phonograph and also as a source

of power for the actuating mechanism of the repeating devices.

The invention will be more clearly understood from the description of a specific embodiment of the invention which I have illustrated by way of example in the accompanying drawings.

It will be understood that the details of construction herein shown are only given to enable those skilled in this art to understand the principles of my invention and to make and use the same, as it will be apparent that the principles which form the basis of my present invention may be applied or utilized in many different constructions while still gaining the desired results.

In said drawings: Figure 1 is a top plan view of the apparatus showing the location of the various elements. Fig. 2 is a similar view of the reproducing and repeating mechanism, parts being shown in horizontal section. Figs. 3 and 4 are diagrammatic details illustrating the operation of one of the valve mechanisms employed. Fig. 5 is an underneath plan view of the electric motor and speed control devices. Fig. 6 is a front elevation of the same. Fig. 7 is a side elevation of the manually operated speed regulator. Fig. 8 is a front vertical section of the same. Fig. 9 is a similar view of the friction brake running in oil. Fig. 10 is a face view of the friction surface employed. Fig. 11 is a top plan view with parts in horizontal section, showing the compressor for the repeating system, and its driving connection. Fig. 12 is a vertical section of the valves employed in the compressor. Fig. 13 is a vertical section of the cam operated valve device for controlling the supply of air under pressure to the repeating devices. Fig. 14 is a side elevation illustrating in detail the outer end of the reproducer arm and parts of the repeating devices. Fig. 15 is a transverse sectional elevation on line XV—XV of Fig. 14. Fig. 16 is a detail vertical section showing the main shaft or arbor and turn-table of the phonograph. Fig. 17 is a detail plan view with parts in section showing the electric switch and its control device. Fig. 18 is a transverse section of the switch plunger. Fig. 19 is a longitudinal section through the switch plunger and its control mechanism.

Referring more specifically to said drawings, 1 indicates the cabinet of the machine,



2 the turn-table or record support, and 3 the main shaft or arbor by which the turn-table and record are supported and driven. The turn-table 2 is threaded on to the arbor 3 at the point 4, and the arbor rotates in a bearing 5, which is secured by threaded collar 6 resting upon the support 7, which forms a part of the cabinet 1. (See Fig. 16.) The arbor 3 rests upon a step bearing indicated at 8 in Figs. 5 and 6. Arbor 3 passes through a housing 9 within which a worm gear 10 secured on said arbor operates under the influence of a worm shaft 11, driven by electric motor 12. Shaft 11 has operatively coupled therewith a ball governor 13, the sliding member 14 of which terminates in a disk 15 within the friction brake housing 16, as illustrated in Fig. 9. The housing 16 has threaded into it a head portion 17, the tubular extension 18 of which is slidably mounted upon a bearing stud 19, which is fixed in the framework 20. Stud 19 is formed with an axial bore in which the reduced end 21 of the shaft 11 is journaled. A ball stop 22 is positioned in said bore by the set screw 23. The inner face 24 of the housing 16 has a tubular inward extension 25 projecting axially toward the disk 15 of the sliding member 14, and in the annular pocket thus provided, a friction body of leather or other suitable material 26 is disposed having its exposed face provided with radial grooves 27.

The space within the housing 16 is supplied with a body of lubricating oil 28 in which the disk 15 runs. The disk 15 engages the friction material 26 and tends to retard the rotation of the shaft 11. During the rotation of the disk 15, lubricating oil is continuously carried around by the disk so that the entire surface of the friction material 26 is thoroughly lubricated, this result being aided by the grooves 27 formed in the lubricating material 26, whereby the lubricating oil is better presented. The high speed of the motor and disk necessitates a thorough and constant lubrication of the friction surface at all times, as otherwise it would be impossible to accurately control the speed of the drive, due to irregular friction and generation of heat. It is this difficulty which has heretofore stood in the way of the successful application of the motor drive to phonographs.

The friction exerted between the material 26 and the disk 15 may be manually regulated. For this purpose the housing 16 is slidably mounted on the stud 19, as above referred to, and any suitable regulating mechanism may be employed for controlling the position of the housing 16. I have herein shown this regulating mechanism as comprising a pin 29 which engages in a perforation formed in sleeve 18, and which is operated axially, of shaft 11 by a screw 30

slid in and out by pinion 31 and segment gear 32. Screw 30 is slidably mounted in bracket 33 which is secured to the framework 34. Segment gear 32 is fixed on shaft or stud 35 by a nut 36, and shaft 35 is freely journaled in the bearing 37 which depends from the framework 34. An operating handle 38 is fixed on the outer end of shaft 35 for rotating the same when the friction brake is to be adjusted manually.

It will be seen that during the operation of the motor 12, the sliding member 14 of the governor 13 will assume a normal position on shaft 11, in which position a constant friction will be exerted between disk 15 and the friction material 26. Any tendency toward increased speed of motor 12 draws the disk 15 into firmer engagement with the friction material 26 so that the retarding influence of the brake is increased and thus the increased speed of the motor is checked. Should the power of the motor 12 tend to diminish, the pressure exerted by disk 15 against the friction material 26 is relieved so that the motor may continue to operate at the same speed. This normal speed is of course at all times under the control of the manual adjustment effected through the operation of lever 38.

The mechanism thus far described constitutes the adjustable constant speed motor drive for the phonograph. The reliable speed control above described, makes it possible to employ the same motor for supplying compressed air to a pneumatic repeating system, without interfering with the pitch of the tone being reproduced. A pressure of from one to two pounds, which may amply suffice for the pneumatic devices, may be generated in this way without perceptible variation in the speed of the motor. A pneumatic repeating system which I have employed for some time with entirely satisfactory results will now be described by way of example.

As illustrated in Fig. 11, the main shaft or arbor 3 of the phonograph has secured to it within the housing 9 an eccentric disk 50 running in oil, which operates a cross-head 51 mounted to slide in ways 52. The crosshead 51 is thus oscillated and during its operation causes a reciprocation of a piston rod 53 which passes through a bearing 54 and into a compressor cylinder 55 where it carries a piston 56. Cylinder 55 has a port 57 open to the atmosphere for permitting the escape of the trapped air behind the piston 56. A valve housing 58 is mounted on the outer end of cylinder 55 and contains passageways for the intake and discharge of air. The air intake occurs through the plug 59, the inner end of which forms a valve seat for the ball check valve 60. The discharge of compressed air takes place through the plug 61 past a ball check valve



62 which seats on an annular shoulder formed in the valve housing 58. The compressed air nipple 63 is threaded into the plug 61 and suitably communicates with the discharge passage therein. A pipe 64 is attached to nipple 63 and leads to a reservoir 65 (see Fig. 1). A safety valve 66 is inserted at the connection of pipe 64 with reservoir 65 to blow off at normal maximum pressure and thus maintain the supply of compressed air within reservoir 65 at constant pressure during the continued operation of the motor 12. A pipe 67 leads from safety valve 66 and has secured thereto a flexible soft rubber hose 68 which passes through a suitable automatic valve device and leads the compressed air to the actuating devices of the repeating system. For the sake of clearness I shall first describe the circuit of the compressed air from this point through the different actuating devices, and afterward consider in detail the operation of the automatic control valve by which the supply of compressed air to the actuating devices is governed.

Referring to Fig. 2, it will be seen that the compressed air is first led from hose 68 to a nipple 69 communicating with a pneumatic cylinder 70. A piston 71 is mounted in cylinder 70 and normally held forward by means of a spring 72. The compressed air entering the cylinder 70 operates the piston 71 against the spring 72 thereby raising the reproducing sound box and needle from the record as will be described. Having traversed a suitable portion of the cylinder 70 the piston in its further travel uncovers a port 73 from which leads the nipple 74 to a pipe 75 which conducts the compressed air thus escaping from cylinder 70 into an intermediate pneumatic cylinder 76 by way of port 77. A piston 78 in said cylinder 76 is thereby operated against the pressure of its return spring 79 while at the same time the compressed air is flowing through connection 80 into the pneumatic cylinder 81 of the shifting mechanism for the reproducer arm. Cylinder 81 has a piston 82 which operates a rod 83 pivotally connected with an arm 84 projecting from a collar 85 which is fixed to the base of the reproducer arm 86. The operation of piston 82 by the compressed air entering the cylinder 81 thus swings the reproducer arm 86 back to the starting point of the record, the needle and sound box having been previously elevated from the record by the action of piston 71 in cylinder 70. The reproducer arm is arrested by the engagement of the screwhead 87 with an adjustable stop 88 which is mounted in the jointed bracket 89 so as to be moved into and out of operative position. The raising of the needle and sound box is accomplished by means of piston rod 90 and push rod 91 secured to rod

90 by adjustable connection 92, and slidably mounted in the stationary sleeve 93 which is fixed in plate 94 secured on the neck 95 of the reproducer arm by means of the strap 96 and bolts 97, as illustrated in Figs. 2 and 15. The push rod 91 at its outer end engages an arm 98 which is adjustably secured to the U tube 99 by means of clamp 100. The outer end of piston rod 90 passes through the plate 94 and is guided therein. The sound box is illustrated at 101 and the needle rod at 102.

Coincidentally with the opening of the control valve which admits air to return the arm, the control valve is closed automatically by the returning arm, thereby shutting off the air supply. During this operation sufficient air has been supplied to the pneumatic devices to enable the accumulator or storage tank 76 to continue the return of the arm and hold the arm against stop 88 until the reproducer needle has been gradually lowered upon the record by the escapement valve which is made adjustable so as to regulate the rapidity at which the needle is lowered. The control valve I have herein illustrated is of simple and reliable construction, in the form of a pinch valve which engages the flexible soft rubber tube 68 to close the passageway. Referring to Fig. 2, this valve is shown as comprising the semi-circular abutment 103 which is mounted on or integral with an adjustable plate 104 pivoted to base plate 105 by means of screw 106 and fixed in adjusted position thereon by screw 107 which passes through the slotted end 108 of the plate 104. This abutment 103 thus constitutes a stationary valve member against which the moving valve member presses the rubber tube to close the passageway. The moving valve member is indicated at 109 and is mounted on or integral with the arm 110 which is pivotally secured to base plate 105 by means of screw 111. Valve member 109 is controlled by a roller 112 journaled on a stud 113, which extends vertically from a horizontal base 114 which is journaled in the bearings 115 and 116. (See Fig. 13.) A leaf spring 117 suitably mounted at the side of base plate 105 engages the projecting end of base 114 and tends to move it to the right in Fig. 13. The stud 113 passes through a slot 118 formed in base plate 105. Base plate 105 is fixed to the standard 119 by set screw 120. The roller 112 by reason of the mounting described is capable of moving bodily toward or away from the stationary cam member 103 and at the same time it may roll upon the moving cam member 109 (Figs. 3 and 4), the stud 113 during this latter motion rocking with the base 114. The roller 112 is under the control of an adjustable cam 121 formed as a segment of a circle, and grooved beneath to slide on a



rib or flange 122 formed on shelf 123 projecting from the collar 85. The arm 84, above referred to, is slotted at 124 on the arc of a circle and through this slot a pin 125 passes into a recess formed in cam 121. Pin 125 is connected with the inner end of the cam adjusting rod 126 by means of the threaded coupling 127. The outer end of the cam adjusting rod 126 passes through the plate 94 (Fig. 15) and has secured thereon a thumb screw collar 128 and a collar 129, both of which collars are seated into plate 94 to prevent longitudinal motion of the adjusting rod 126.

It will be seen from the construction described, that the position of cam 121 with relation to arm 84 and reproducer arm 86, may be adjusted by turning the thumb screw 128, whereby the cam is moved toward or away from the outer end of the reproducer arm. It is also clear that the cam 121 will move relatively to the roller 112 when the reproducer arm moves. The position of cam 121 is so adjusted by the adjusting rod 126 that the cam will release the roller 112 when the reproducer arm arrives at the end of the record, so that the repeater devices are set in motion by the compressed air thus admitted. Having arrived at the termination of the record, the cam 121 which has been properly adjusted releases roller 112, whereupon the roller is thrown out of engagement with the valve member 109 by the action of leaf spring 117 and by the pressure of the flexible hose 68. The air is then admitted into cylinder 70, whereupon the piston 71 is moved outward and thus the push rod 91 is brought into engagement with the arm 98 and the reproducing needle is raised off the record. At the completion of this operation the piston 71 has uncovered the port 73 so that the compressed air is admitted into cylinders 76 and 81, storing a charge of compressed air in cylinder 76 while at the same time operating piston 82 in cylinder 81 so as to swing the reproducer arm back to the starting point of the record. The adjustable stop 88 has previously been adjusted to arrest the reproducer arm upon its arrival at the proper point on the record. In the act of arresting the reproducer arm, the screw head 87 is engaged by the stop 88. Screw head 87 may form a part of an adjustable escape valve operating stem 130 which upon the engagement of head 87 with stop 88 is caused thereby to open a by-pass, whereby the pressure in the actuating devices, and especially in cylinder 70, is permitted to escape. Preferably however the escape valve is manually adjusted as illustrated instead of being automatically operated, and the escape of air through the escape valve is continuous but not at a sufficient rate to prevent the described operation of the pneumatic devices.

With the escape of this pressure the piston 71 returns to normal position under the influence of spring 72, thus permitting the sound box and reproducer needle to return to the record. Prior to the opening of the by-pass by the valve operating stem 130, the reproducer arm has arrived at the beginning of the record, and in reaching this position the cam 121 which as before stated, swings with the arm, has again engaged the roller 112 and forced it against the valve member 109 thus pinching the tube 68 against the stationary valve member 103 and cutting off further supply of compressed air to the actuating devices. The cylinder 76 serves as a storage reservoir for the supplemental supply of compressed air for insuring the completion of the return of reproducer arm 86 after the supply of compressed air has been discontinued by the shutting-off of valve 109.

The electric switch by which the supply current to the motor 12 is controlled is illustrated in Figs. 1 and 17 to 19. Referring especially to Fig. 1, the connection with the line is made by the plugging-in switch 150 from which the conductors 151, 152 and 153 lead to and from the motor 12. The local switch is inserted between conductors 152 and 153. These conductors are connected with binding posts 154 and 155 which have terminal plates 156 and 157 in position to be bridged by the plunger contact 158. The local switch is mounted on the base 105. The plunger 158 has a narrow extension passing under the edge of base plate 105 from which a pin having a roller 159 extends upwardly through a slot 160 of base plate 105. The extension terminates in an upward bend 161 passing through a slot 162 in the base plate 105 and provided with a ball 163. The slot 160 is provided with a shoulder 164 (see Fig. 17) against which the roller 159 is normally held during the closed position of the switch by means of a spring 165 which is mounted in a recess of switch base 166 and operates against a sleeve 167 which abuts against the enlargement of the switch plunger. The circuit may be opened by engaging the ball 163 to free the roller 159 from shoulder 164. This may be effected manually or automatically. To effect this operation automatically, the collar 85 which is fixed on the base of the reproducer arm 86, has a radial extension 168 (Fig. 2). For automatically stopping, the jointed bracket 89 is thrown out of the path of the screw-head 87 so that the reproducer arm 86 is free to go beyond the beginning of the record, whereupon the radial projection 168 will swing into engagement with the ball 163 and throw the roller 159 out of engagement with the shoulder 164, so that the switch is thrown open under the influence of the opening spring 165.

The outer portion of the switch plunger 158 may be constructed in the form of a brake shoe 169 so as to apply a brake to a moving part of the apparatus, for example the turntable, as illustrated in Fig. 1.

I claim:

1. Apparatus of the character described comprising in combination a phonograph having a record support to be driven, pneumatic repeating devices, a compressor for supplying air thereto, a motor operatively connected with said record support and said compressor, and means for maintaining the speed of said motor constant.

2. Apparatus of the character described comprising in combination a phonograph having a record support to be driven, pneumatic repeating devices, a compressor for supplying air thereto, a motor operatively connected with said record support and said compressor, and adjustable means for maintaining the speed of said motor constant.

3. Apparatus of the character described comprising in combination a phonograph having a rotary record support to be driven, pneumatic repeating devices, a compressor for supplying air thereto, an eccentric disk rotating with said record support, a cross head operated thereby and operatively connected with said compressor, and a constant speed motor drive for said rotary record support.

4. A repeating phonograph comprising in combination a reproducer arm and needle, pneumatic devices for first raising the needle and then shifting the arm, means for supplying air to said pneumatic devices, and a control valve for said air supply controlled by the movement of said arm.

5. A repeating phonograph comprising in combination a reproducer arm and needle, pneumatic devices for first raising the needle and then shifting the arm, means for supplying air to said pneumatic devices, a control valve for said air supply, and adjustable valve actuating means operated by the movement of said arm.

6. A repeating phonograph comprising in combination a reproducer arm and needle, a pneumatic device for raising the needle, a second pneumatic device controlled thereby for shifting the arm, and means for supplying air to said pneumatic devices.

7. A repeating phonograph comprising in combination a reproducer arm and needle, adapted to follow the record, pneumatic devices for first raising the needle and then shifting the arm, a valve for controlling the supply of air to said pneumatic devices, valve actuating means moving with said arm to open said valve at the ending of the record, and a stop for arresting said arm upon its return to the commencement of the record.

8. A repeating phonograph comprising in

combination a reproducer arm and needle, adapted to follow the record, pneumatic devices for first raising the needle and then shifting the arm, a valve for controlling the supply of air to said pneumatic devices, adjustable valve actuating means moving with said arm, means for setting said actuating means to operate upon arrival of said arm at the end of the record, and adjustable means for arresting the arm upon its return to the commencement of the record.

9. A repeating phonograph comprising in combination a reproducer arm and needle, adapted to follow the record, pneumatic devices for first raising the needle and then shifting the arm, means for supplying air thereto, a control valve for said air supply, a cam carried by said arm and an intermediate roller engaged thereby for actuating said valve.

10. A repeating phonograph comprising in combination a reproducer arm and needle, adapted to follow the record, pneumatic devices for first raising the needle and then shifting the arm, means for supplying air thereto, comprising a flexible hose, a stationary valve member and a movable valve member between which said hose extends, a swinging roller adapted to engage said movable valve member to shut off the air supply through said hose, and a cam carried by said arm for moving said swinging roller into engagement with said movable valve member.

11. A repeating phonograph comprising in combination a reproducer arm and needle, adapted to follow the record, pneumatic devices for first raising the needle and then shifting the arm, means for supplying air thereto, comprising a flexible hose, an adjustable stationary valve member and a moving valve member between which said hose is led, a swinging roller adapted to engage said moving valve member to close the hose, a spring tending to force said roller away from said moving valve member, and an adjustable cam carried by said arm and adapted to hold said roller against said moving valve member during a predetermined range of movement of said arm.

12. A repeating phonograph comprising in combination a reproducer needle and arm, adapted to follow the record, pneumatic repeating devices for first raising the needle and then shifting the arm, an air supply therefor, automatic means for admitting air to said devices at the completion of the record for raising the needle and shifting the arm, and adjustable means for releasing the air therefrom.

13. Apparatus of the character described comprising in combination a phonograph having a rotary part to be driven and a reproducer arm and needle, automatic repeating devices for said arm and needle, a stop



movable into and out of arm arresting position for arresting the shifted arm at the commencement of the record, a constant speed motor drive for said rotary part, a  
5 current supply circuit for said motor drive, and an automatic throw-out switch for said circular operated by the shifted arm when said stop is out of arm arresting position.

14. Apparatus of the character described  
10 comprising in combination a phonograph having a rotary part to be driven and a reproducer arm and needle adapted to follow the record, automatic repeating devices for first raising the needle and then shifting the  
15 arm, a stop movable into and out of arm arresting position to arrest the shifted arm at the commencement of the record, a constant speed motor drive for said rotary part, a circuit for supplying current to the motor  
20 thereof, an automatic throw-out switch for said circuit, means carried by said arm for operating said throw-out switch when said

arm arresting stop is out of arm arresting position, and a brake carried by said throw-out switch for arresting the rotation of said  
25 rotary part when said throw-out switch is operated.

15. Apparatus of the character described comprising in combination a phonograph having a reproducer arm and needle adapted  
30 to follow the record, automatic means for first raising the needle and then shifting the arm, a stop movable into and out of arm arresting position to arrest the shifted arm at the commencement of the record, an auto-  
35 matic brake, and means carried by said arm for controlling the application of said automatic brake by the movement of said arm when said arresting stop is out of arm arresting position.

ALBERT F. MADDEN.

Witnesses:

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WM. A. COURTLAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

RESONATOR,  
# 1,127,320-----H. P. Tiffner,  
Patented-February 2nd, 1915.  
Filed-March 16, 1911.

H. P. TIFFNER.

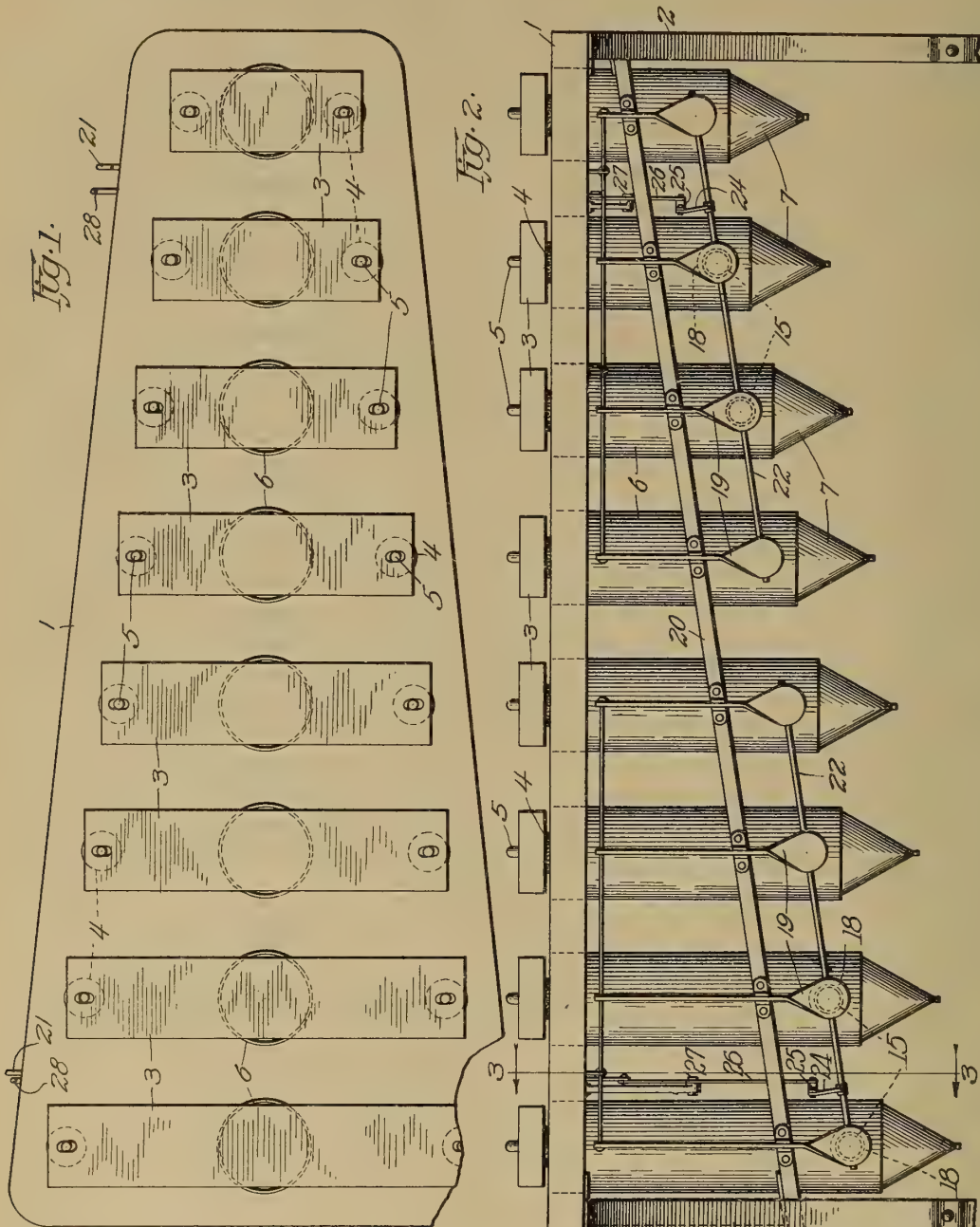
RESONATOR.

APPLICATION FILED MAR. 16, 1911.

1,127,320.

Patented Feb. 2, 1915.

2 SHEETS—SHEET 1.



Witnesses:

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Inventor

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Att'y.





H. P. TIFFNER.

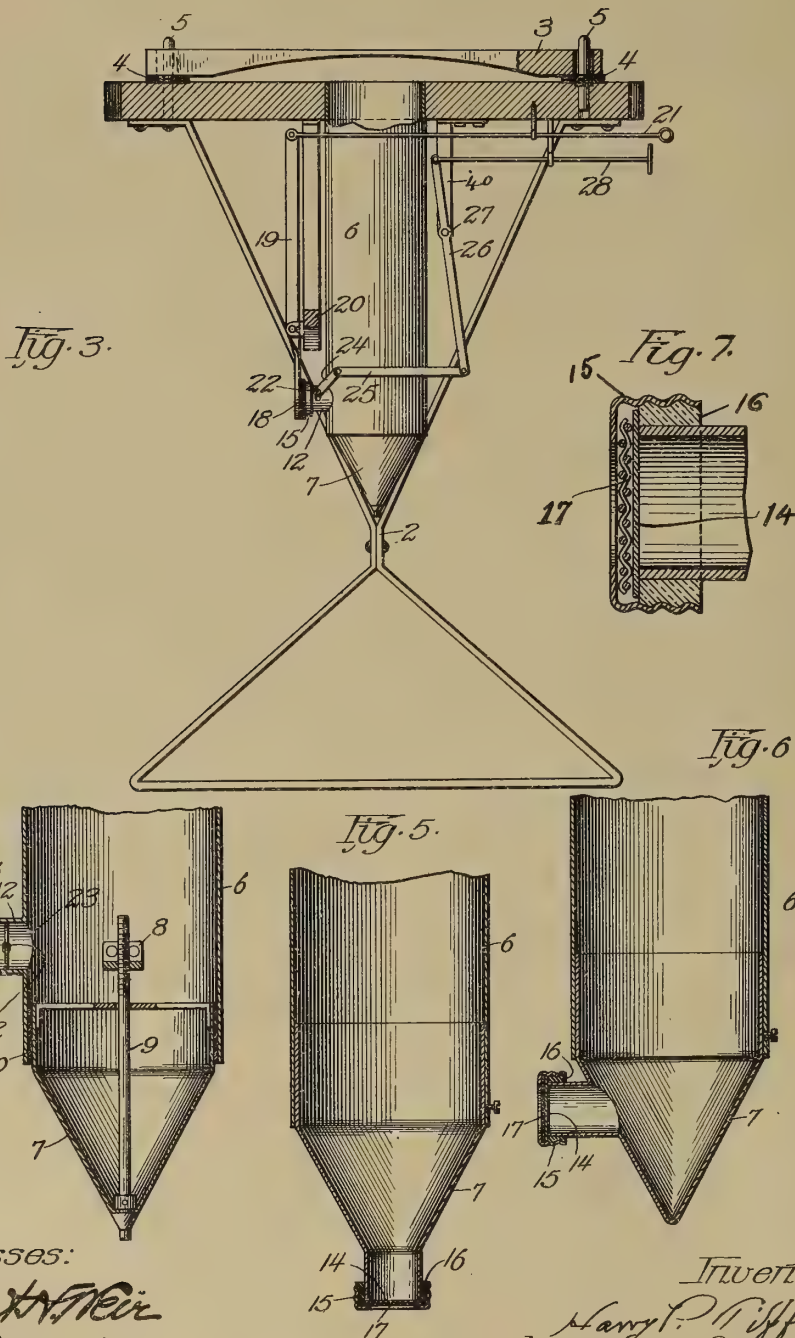
RESONATOR.

APPLICATION FILED MAR. 16, 1911.

1,127,320.

Patented Feb. 2, 1915.

2 SHEETS—SHEET 2.



Witnesses:

Robert W. Kerr  
J. M. Daggett.

Inventor

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by Burton H. Keller  
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# UNITED STATES PATENT OFFICE.

HARRY P. TIFFNER, OF CHICAGO, ILLINOIS.

## RESONATOR.

1,127,320.

Specification of Letters Patent.

Patented Feb. 2, 1915.

Application filed March 16, 1911. Serial No. 614,798.

*To all whom it may concern:*

Be it known that I, HARRY P. TIFFNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Resonators, of which the following is a description.

My invention relates to a device adapted for use with certain musical instruments to improve or control the volume or quality of the musical tones produced by the instrument.

The object of my invention is to produce a simple, efficient and reliable device of the kind described, especially applicable to xylophones, gongs, bells and similar instruments whereby the operator may produce any desired volume or quality of tone desired within the capacity of the instrument.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the claims.

In the accompanying drawings wherein like or similar reference characters indicate like or corresponding parts: Figure 1 is a plan view of a xylophone equipped with my improvement. Fig. 2 is a front elevation of the same. Fig. 3 is a section taken substantially on line 3—3 of Fig. 2. Fig. 4 is an enlarged sectional detail of the lower portion of the resonators shown in Figs. 1, 2 and 3. Figs. 5 and 6 are views similar to Fig. 4 but showing slightly modified forms of my device. Fig. 7 is an enlarged sectional detail of the head portion and associated parts of a resonator of my device.

In the drawings merely for the purpose of illustration my improved resonator is shown as forming a part of a xylophone in which 1 is the table or upper frame of the instrument supported on suitable legs or other convenient means 2—2. The bars 3—3 for producing the musical tones are shown supported at each end upon the frame 1 with a pad or washer 4 of felt or other resilient material positioned between the bar and frame adapted to support the bar in position without interfering with its musical properties. A pin or peg 5 is provided at each side of the frame 1. Each pin extends through a suitable opening near the end of the bar to prevent its longitudinal or lateral movement, the whole being arranged

and constructed in the usual or any desired manner and of any suitable material.

In the form shown, the bars are arranged in a substantially horizontal position and each bar is provided with a resonator comprising a tube 6, positioned immediately beneath its particular bar and extending downward at substantially right angles to the bar. The upper end of the tube 6 is preferably positioned at a suitable distance from the underside of the bar to receive the vibration from the bar, without in any way interfering with its vibrations. In the preferred construction a conical part 7 is positioned in the lower end of each tube with suitable means connecting the tube and part 7 for adjusting its longitudinal position in the tube and rigidly maintaining the part in position. The joint between the part 7 and the walls of the tube 6 is preferably packed with a ring of felt or other non-resonant material so as to prevent any discord arising from the independent vibration or rattling between the tube walls and the part 7. The ring packing 10 also prevents the escape of air at the lower end of the tube and increases the effect produced by the resonator. The position of the part 7 may be adjusted in any suitable manner. As shown, a bar 8 extends across the tube with a threaded opening formed near its center at the axis of the tube. A stem 9 is rotatably secured to the part 7 and provided with a threaded part arranged to cooperate with the threaded opening in the bar 8 so that the stem may be engaged with the bar and by rotating the stem the part 7 may be adjusted as desired. In the preferred construction a cross piece 11 is provided at the top of the part 7 arranged to maintain the stem 9 in a central position and prevent the tipping or disarrangement of the part 7 in the tube.

The several parts of my device above described are shown circular in section and formed of brass or other suitable material, but it is obvious that the several parts may be formed of wood or any material adapted to cooperate as above described and impervious to air, although a better result is no doubt attained by using a material capable of producing a musical tone when vibrated.

The several parts above described constitute a resonator of substantially the usual form with the exception of the conical part



7 and the adjustment provided therefor whereby the resonator may be accurately and quickly tuned and a resonator having a conical lower end produces a slightly more  
 5 satisfactory dwell or prolongation of the tone than where the end of the tube is closed by a part positioned at substantially right angles of the tube.

The principal feature of my improved resonator however consists in a vibratory head  
 10 14 preferably positioned across an opening near the closed end of the tube so arranged that the vibration of the bar 3 above the tube is transmitted by the pulsations of the  
 15 air in the tube to the head causing the same to correspondingly vibrate, thereby producing a marked mellowing effect upon the musical tone produced and greatly increasing the volume of the tone. In the preferred  
 20 construction shown a tubular port 12 is provided in the wall of the tube 6 near its closed end at substantially right angles to the tube with the disk or head 14 extending across the port and entirely closing the end thereof.

The head 14 may be formed of any thin, flexible material, such for example, as very fine gold beaters skin or extremely thin and preferably soft parchment. I have found it desirable however, to secure the best results, to provide a specially prepared parchment, thinner and much more flexible than either of the substances above mentioned. In the preferred construction the parchment disk 14 is wholly unattached at its  
 35 margins and merely rests loosely across the end of the duct 12 so that the slightest pulsation of air within the tube will vibrate the head 14 and produce a musical tone. Any suitable means may be provided to control the position of the head 14 and protect the head when in service. In the preferred construction I provide a disk of fine wire gauze 17 extending across the duct 12 outside of the head 14 and the several parts are secured  
 45 in position by means of a ferrule or thimble 15 having a central opening corresponding to the bore of the duct and with a body portion of suitable size to receive a ring of leather, rubber or other suitable material 16 adapted to hold the head 14 and disk 17 in the ferrule with the inner diameter of the ring of suitable size to fit upon the exterior of the duct and resiliently maintain the several parts in position.

In the preferred construction suitable means are provided to modify or wholly prevent the vibrations of the head 14 to control the operation of my improvement. In the form shown I provide a damper and a cut-out; the damper consists of a pad of suitable material 18 adapted to press against the disk 17 to control or partially prevent the vibrations of the head. Obviously the force with which the pad 18 is pressed against the disk 17 largely controls the operation of the

head, although in actual practice it is found that even when considerable pressure is put upon the disk 17 resonant action is not wholly prevented. Any suitable means may be provided to control the operation of the  
 70 pad 18; as shown, the pad is mounted at one end of a lever 19 which is in turn pivotally mounted intermediate its ends upon a bar 20. Suitable means are attached to the free end of the lever 19 extending to a convenient  
 75 position, as for example, the rod 21 by which the operator may manually control the position of the pad 18. Obviously if desired the several levers 19 may be operated by a pedal or any other convenient means  
 80 (not shown).

The cut-out preferably consists of a valve adapted to wholly close the duct between the head 14 and the tube 6, so that the duct is wholly closed to the tube. In the form  
 85 shown a shaft 22 is provided common to a plurality of the ducts extending centrally through each. A valve 23 is positioned in each duct and rigidly secured to the shaft 22 so that when the valves are closed, as shown  
 90 in Fig. 4, a quarter turn of the shaft will simultaneously open the several valves to their fullest capacity. Any suitable means may be provided to control the movement of the shaft 22. As shown an arm 24 is rigidly  
 95 secured to the shaft with its free end connected by a link 25 to a lever 26 which is in turn pivotally mounted as at 27 upon a suitable bracket 40 or other convenient means. A rod 28 or other convenient means is attached to the free end of the lever 26 so that a longitudinal movement of the rod will rotate the shaft 22 and control the position of the valves.

The duct 12 may be formed at any convenient point near the closed end of the tube, although it is believed that the nearer the duct is positioned to the end of the tube the more satisfactory the operation of my device. In the form shown in Figs. 2, 3 and  
 110 4 the duct extends through the wall of the tube 6 while in Fig. 5 the duct is formed at the apex of the part 7 and in Fig. 6 the duct is formed through the conical wall of the part 7 extending perpendicular to the  
 115 tube. The several forms are obviously very similar and each produce very similar results. In all cases it should be noted that the length of the tube 6 or in other words the pitch of the resonator must accurately  
 120 correspond with the pitch of the gong, the bar of the xylophone or other instrument with which it is to cooperate to secure satisfactory results.

Where it is desired to use my resonator upon clock gongs or in other places where the simplest form of mechanism is desired I have found that very satisfactory results may be obtained by forming the walls of the tube 6 of brass or other suitably sonorous  
 130

material of suitable size to produce the desired tone when struck or otherwise vibrated. The operation of my device however remains substantially as hereinbefore described, except that the bars 3 are omitted and the initial sounds or vibrations are set up by the tube walls and provides a very simple and pleasing instrument where chimes or a single tone is required.

10 Having thus described my improvement it is obvious that various immaterial modifications may be made in my device without departing from the spirit of my invention, hence I do not wish to be understood as  
15 limiting myself to the exact form or construction shown.

What I claim as new and desire to secure by Letters Patent is:

1. A resonator comprising a tube, and  
20 means arranged to close one end of said tube, said resonator having an opening near its closed end, in combination with a vibratory head extending across said opening, and means for supporting said head in po-  
25 sition.

2. A resonator comprising a tube and a longitudinally movable member arranged to close one end of said tube, said resonator having an opening near its closed end, in  
30 combination with a vibratory head extending across said opening, and means for supporting said head in position.

3. A resonator comprising a tube and a conical member positioned in and arranged  
35 to close one end of said tube, said resonator having an opening near its closed end, in combination with a vibratory head extending across said opening, and means for loosely supporting said head in position.

40 4. A resonator comprising a tube, and means arranged to close one end of said tube, said resonator having an opening near its closed end, in combination with a vibratory head extending across said opening, manu-  
45 ally operated means adapted to prevent

the vibration of said head, and means for supporting said head in position.

5. A resonator comprising a tube and means arranged to close one end of said tube, said resonator having an opening near  
50 its closed end, in combination with a vibratory head extending across said opening, means extending across said opening adapted to control the position of said head, and means for loosely supporting said head in 55 position.

6. A resonator comprising a tube and a longitudinally movable conical member positioned in and arranged to close one end of  
60 said tube and a tubular port near said closed end, in combination with a vibratory head extending across said port, and means for supporting said head in position.

7. A resonator comprising a tube and a longitudinally movable conical member po-  
65 sitioned in and arranged to close one end of said tube, and a tubular port near said closed end, in combination with a vibratory head extending across said port, means positioned in said port adapted to control the  
70 position of said head, manually operated means adapted to prevent the vibration of said head, and means for supporting said head in position.

8. A resonator comprising a tube and a  
75 conical member positioned in and arranged to close one end of said tube, said resonator having an opening near its closed end, in combination with a vibratory head extending across said opening, means extending  
80 across said opening adapted to control the position of said head, and means for supporting said head in position.

In testimony whereof, I have hereunto signed my name in the presence of two sub-  
85 scribing witnesses.

HARRY P. TIFFNER.

Witnesses:

BURTON W. HILLS.

BLANCHE CHALMERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





SOUND REPRODUCER.

# 1,127,765 - J.J.HARRISON & T.H.HUPFER,  
Patented-Feb. 9, 1915.  
Filed-August 20, 1913.

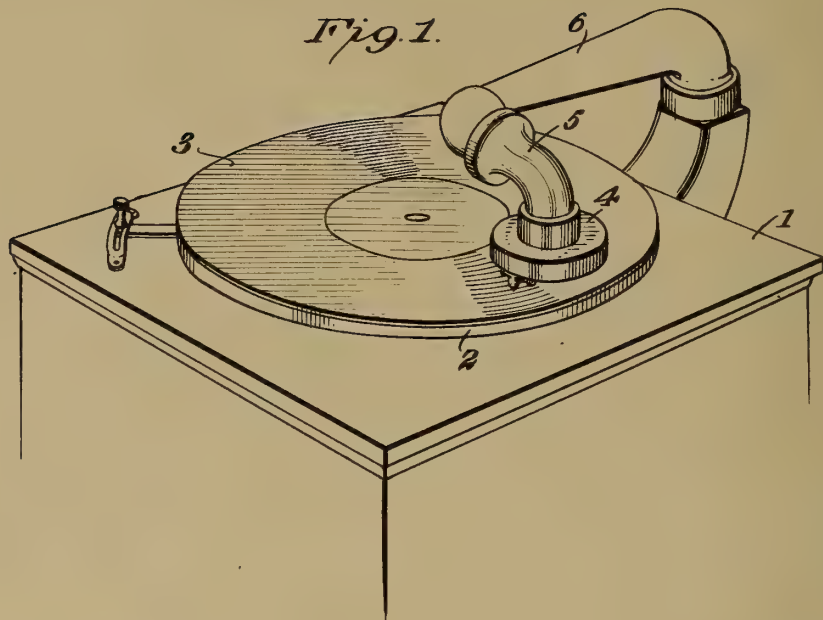
J. J. HARRISON & T. H. HUPFER.

SOUND REPRODUCER.

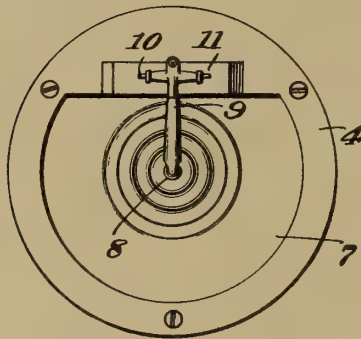
APPLICATION FILED AUG. 20, 1913.

1,127,765.

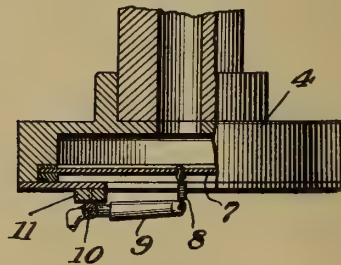
Patented Feb. 9, 1915.



*Fig. 2.*



*Fig. 3.*



Witnesses;  
*J. Adolph Bishop*  
*W. Smith*

Inventors  
*James J. Harrison*  
*Theodore H. Hupfer*  
*J. R. Cornwall* Atty

# UNITED STATES PATENT OFFICE.

JAMES J. HARRISON AND THEODORE H. HUPFER, OF ST. LOUIS, MISSOURI.

SOUND-REPRODUCER.

1,127,765.

Specification of Letters Patent.

Patented Feb. 9, 1915.

Application filed August 20, 1913. Serial No. 785,708.

*To all whom it may concern:*

Be it known that we, JAMES J. HARRISON and THEODORE H. HUPFER, citizens of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Sound-Reproducers, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which,—

Figure 1 is a view illustrating our improved sound reproducer in operative position. Fig. 2 is a bottom plan view of the same. Fig. 3 is a vertical sectional view.

This invention relates to a new and useful improvement in sound reproducers for phonographs, graphophones, and the like, the object being to construct a reproducer which will be sensitive in the reproduction of sound from vertical cut records, and at the same time adapted to feed across the record simply by the tracking of the stylus in the record grooves, and without the employment of any special feeding mechanism.

In the drawings 1 indicates the casing containing the working parts of the machine and 2 is the rotating table on which the disk 3 is arranged.

4 is the casing of the sound reproducer connected to the vertically movable elbow 5 mounted on the end of the horizontally movable swinging arm 6 which latter is connected to the horn of the machine.

7 is the diaphragm mounted in the reproducer casing which diaphragm is connected to the reproducing stylus by means of a spring 8 and an arm 9. Spring 8 is of such strength that it will support or counter-balance the weight of the reproducer without being stretched to its limit and at the same time sufficiently pliable to yield to abnormal relative movements of the reproducer casing or arm and the stylus when the latter is in engagement with the record. The arm 9 which carries the reproducing stylus and to which the spring 8 is connected, is pivotally mounted upon a pin 10 passing through lugs in a cross bridge 11 forming the base plate of the sound reproducing box.

The mounting of the arm 9 is such that it has absolutely no lateral or longitudinal play, and consequently, the stylus is capable

of vertical movement only. The axis upon which the arm is pivoted is arranged at substantially right angles to the direction of the record grooves. By virtue of this fashion of mounting, when the stylus is operated in a record groove it will have the vertical movement necessary to reproduce from the vertical cut record, and being incapable of any other movement, and being held in engagement in the groove by the spring 8 and weight of the reproducer arm, it will automatically feed itself and the reproducer arm across the record by its tracking in the groove.

An important consideration is the proper tensioning of spring 8 so that it will have the proper resiliency to compensate for excessive movements of the reproducer, and at the same time the proper inertia to transmit the finer and more delicate vibrations from the record to the diaphragm. A reproducer of this type may be used upon a machine, such as the well known Victor or Columbia, or other machine not equipped with mechanism for feeding the reproducer across the record, and thereby permit the playing of vertically cut records on such machine.

What we claim is:

A sound reproducer comprising a casing, a diaphragm mounted thereon in position such that one face thereof is presented toward the record when in operative position, said casing being provided with a bridge member, a stylus arm pivoted on said bridge member so that its extremities are capable of movement toward and from said diaphragm only, one of the extremities of said arm being provided with a stylus adapted to co-operate with the record, the other extremity of said arm being connected directly to the diaphragm by a resilient member having sufficient resiliency to yield to abnormal movements of the casing relative to the stylus but having the proper inertia to transmit the ordinary vibratory movements from the stylus arm to the diaphragm.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses, this 18th day of August, 1913.

JAMES J. HARRISON.  
THEODORE H. HUPFER.

Witnesses:

M. P. SMITH,  
M. A. HANDEL.



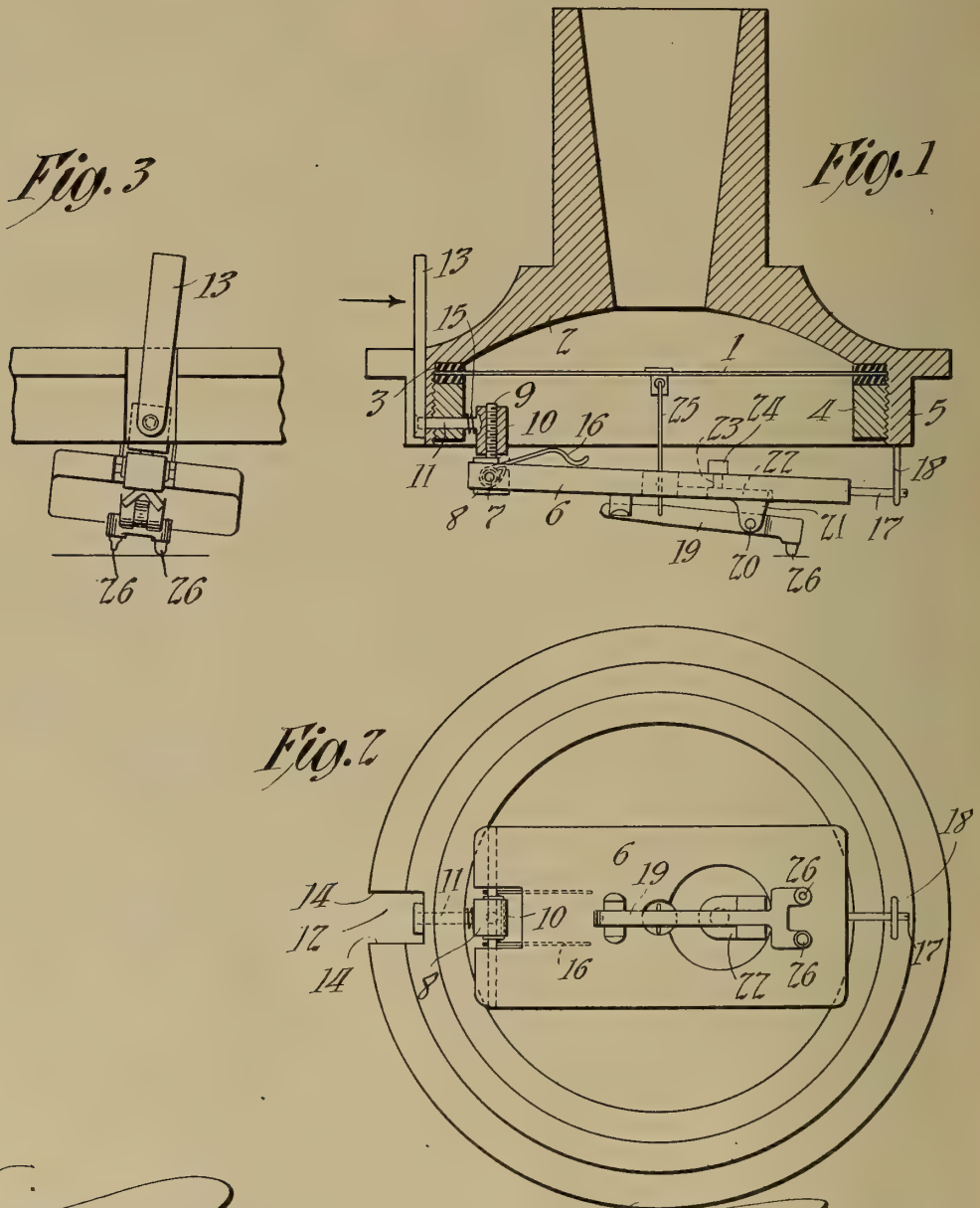


PHONOGRAPH REPRODUCER,  
# 1,127,873 - F. L. DYER,  
Patented-February 9, 1915.  
Filed -May 22, 1909.

F. L. DYER.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED MAY 22, 1909.

1,127,873.

Patented Feb. 9, 1915.



*Witnesses:*  
 Frank D. Lewis  
 Dyer Smith

*Inventor:*  
 Frank L. Dyer



# UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-REPRODUCER.

1,127,873.

Specification of Letters Patent.

Patented Feb. 9, 1915.

Application filed May 22, 1909. Serial No. 497,758.

*To all whom it may concern:*

Be it known that I, FRANK L. DYER, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers, and my object is to provide an effective and novel means for mounting a pair of reproducing styli connected to the diaphragm of the reproducer in such a manner that either may be simply and effectively adjusted into position to coöperate with a record groove of a distinctive character, so that, for example, a stylus adapted to coöperate with a record having 100 threads per inch and a stylus adapted to coöperate with a record having 200 threads per inch may be mounted in the same reproducer.

In carrying out my invention, I preferably mount the styli on one end of a pivotally supported stylus lever; the styli being disposed on opposite sides of the center line of said lever, and provide means for swinging said lever through an arc about an axis approximately parallel to the center line of said lever for the purpose of lowering either stylus into operative position, while raising the other out of such position.

Other objects of my invention reside in the construction of parts and combinations of elements as described in the following specification and particularly pointed out in the appended claims.

Attention is hereby directed to the accompanying drawings forming part of this specification, in which the same reference characters are used throughout to denote corresponding parts, and in which—

Figure 1 represents a vertical section through a reproducer embodying my invention; certain parts thereof being shown in elevation; Fig. 2 is a bottom plan view of the same, and Fig. 3 is a fragmentary end view of the reproducer shown in Fig. 1 looking in the direction of the arrow shown in connection therewith.

Referring to the drawings, the diaphragm 1 is horizontally mounted in the reproducer body or sound box 2, being held between rings 3 and secured in place by the clamping ring 4, which is threaded within depending

annular flange 5 of the reproducer body in the well known manner. The weight or supporting member 6 is pivotally supported by the horizontal pin 7 which is mounted in vertical block 8 which is formed integrally with or is secured to the substantially vertical pin 9 which is threaded within or is otherwise rotatably secured within the member 10. The member 10 has formed integrally therewith or secured thereto the horizontal pin 11 which is pivotally mounted in the clamping ring 4 and the flange 5 of the reproducer. The member 10 is thus secured inside the clamping ring 4, the outer end of pin 11 extending into a cutaway portion 12 of the depending flange 5 of the reproducer body. The lever or manipulative member 13 is secured to this outer end of pin 11 and extends up through recess 12 to form a handle by which the pin 11 may be rotated through a limited arc, the walls 14 of the recess 12 forming stopping means for limiting such motion. Any suitable means may be provided for retaining the pin 11 and connected parts in any adjusted position. I have shown the spiral spring 15 encircling the pin 11 and confined between the bore of the clamping ring 4 and the adjacent surface of member 10 for frictionally holding the pin in its adjusted position. The spring 16 has end coiled about the pivot pin 7 of supporting member 6, the other end of spring 16 bearing upon the upper surface of member 6 to force the same downwardly. The pin 17 is provided extending from the surface of supporting member 6 at a point diametrically opposite from the pivotal mounting of said member, said pin coöperating with a stirrup 18 depending from the lower surface of flange 5 of the reproducer body to limit the downward and lateral movement of supporting member 6 in the well known manner. Stylus arm or lever 19 is pivotally supported on horizontal pin 20, which is held by lugs or ears 21. These ears 21 may be formed integral with the lower surface of weight 6, or they may be integral with a member supported by said weight 6 and having rotative movement relative thereto to afford greater lateral movement to the stylus or styli carried by the stylus lever 19. I have shown such a mounting in the drawings, in which lugs 21 are integral with a member having a portion 22 mounted

in a recess in the lower surface of supporting member 6 and extending backwardly approximately in a horizontal direction from said ears 21, the pin 23 rising from the end  
 5 of said offset portion 22 and having a head 24 resting upon the upper surface of weight 6 or supported rotatably in said member 6 in any other convenient manner to form a substantially vertical pivot in the said member.  
 10 The lever 19 is connected by the link 25 to the center of diaphragm 1 in the well known manner. The stylus lever 19 is formed at its end opposite from that to which the link 25 is connected with a forked  
 15 portion, the prongs of the fork extending on opposite sides of the center line of lever 19, and each carrying a stylus 26. One of these styli is adapted to co-act with a record of a certain character as for example, a record  
 20 having 100 threads per inch, while the other stylus is adapted to co-act with a record of a different character, as for example, one having 200 threads per inch. These styli are so formed and are so positioned as  
 25 to properly co-act with their appropriate records when stylus lever 19 is swung through a certain predetermined angle about the pin 11 as an axis.

In Fig. 3 one stylus 26 is shown in operative position for tracking a record having  
 30 100 threads per inch, while the other stylus 26, which is adapted to track a 200 thread record, is shown elevated out of operative position.

It is to be understood that while I have described the preferred form of my invention, I am not necessarily limited to the exact construction of parts disclosed, but may  
 35 modify the same within the terms of the appended claims.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a device of the class described, the  
 45 combination of a stylus arm or lever, a plurality of styli carried by said arm or lever, and supporting means for said arm or lever, said supporting means being movable about  
 50 an axis extending longitudinally of said arm or lever to move one stylus into operative position and the other therefrom and being also free to move with either stylus  
 in operative position to permit the stylus  
 55 to follow irregularities in the record surface, substantially as described.

2. In a phonograph reproducer, the combination with a sound box and a diaphragm mounted therein, of a stylus lever, means  
 60 connecting said lever and diaphragm, a plurality of styli carried by said lever, and means on which said lever is pivotally mounted, said last named means being movable about an axis substantially parallel to  
 65 the longitudinal axis of the stylus lever to place one stylus in operative position and

to remove the other therefrom, substantially as described.

3. In a phonograph reproducer, the combination with a sound box and a diaphragm mounted therein, of a stylus lever, means  
 70 connecting said lever and diaphragm, two styli carried by said lever on opposite sides of the longitudinal center line of the lever, a floating weight for supporting said lever and means for adjusting the position of  
 75 said weight with respect to said sound box to place either one of said styli in operative position and remove the other therefrom, substantially as described.

4. In a phonograph reproducer, the combination with means responsive to sound  
 80 vibrations, of a stylus lever, a link connecting said means and lever, two styli carried at one end of said lever, means for supporting said lever with either of said styli  
 85 in operative position, and means for swinging said supporting means and said lever in a vertical arc transverse to said lever to place either one of said styli at will into  
 operative position and remove the other  
 90 therefrom, substantially as described.

5. In a phonograph reproducer, the combination with means responsive to sound vibrations, of a stylus lever, a link connecting  
 95 said means and lever, two styli carried at one end of said lever, a support to which said lever is pivoted, a member to which said support is pivoted to allow vertical movement of said support, and means pivotally supporting said member to allow adjustment of said support in a vertical lateral  
 100 arc, substantially as described.

6. In a phonograph reproducer, the combination with a weight, a stylus lever supported thereby and a stylus carried by said  
 105 lever, of a horizontal pivot for said weight, a member in which said pivot is mounted, a horizontal pivot for said member at right angles to said first mentioned pivot, and a body supporting said pivot for adjusting  
 110 said stylus into and out of operative position, substantially as described.

7. In a phonograph reproducer, the combination with a weight, a stylus lever supported thereby and a stylus carried by said  
 115 lever, of a horizontal pivot for said weight, a member in which said pivot is mounted, a horizontal pivot for said member at right angles to said first mentioned pivot, and a body supporting said pivot for adjusting  
 120 said stylus into and out of operative position, and means for holding said last named pivot in adjusted position, substantially as described.

8. In a phonograph reproducer, the combination with a weight, a stylus lever supported thereby and two styli carried at the  
 125 end of said lever at opposite sides of the longitudinal center line thereof, of means for swinging said weight about an axis ap- 130



proximately parallel to said center line to adjust either stylus into operative position, substantially as described.

9. In a phonograph reproducer, the combination with a weight, a stylus lever supported thereby and two styli carried at the end of said lever at opposite sides of the center line thereof, of means for swinging said weight about an axis parallel to said center line to adjust either stylus into operative position, and means for holding said weight in adjusted position, substantially as described.

10. In a device of the class described, the combination of a stylus arm or lever, a plurality of styli carried by said arm or lever, and supporting means for said arm or lever, said supporting means being movable about an axis substantially parallel to the longitudinal axis of said arm or lever to place one stylus in operative position and to remove the other therefrom, substantially as described.

11. In a phonograph reproducer, the combination with vibratory means, of a stylus lever, connections between said means and one extremity of said lever, supporting means to which said lever is pivoted, and a mounting in which said supporting means is revoluble about an axis extending longitudinally of said lever and substantially parallel to the normal position of said vibratory means, substantially as described.

12. In a phonograph reproducer, in combination, a stylus lever, a plurality of styli projecting therefrom, a member in which said lever is pivoted, supporting means in which said member is rotatably mounted, the axis of rotation of said member extending longitudinally of said lever, and means for holding said lever in position for either of said styli to engage the record, substantially as described.

13. In a phonograph reproducer, in combination, a stylus lever, a plurality of styli projecting therefrom, a member in which said lever is pivoted, and supporting means in which said member is rotatably mounted, the axis of rotation of said member extending longitudinally of said lever, substantially as described.

14. In a phonograph reproducer, the combination with vibratory means and a floating weight, of a stylus lever pivotally connected to said weight, two styli projecting from different portions of said lever, connections between said vibratory means and said lever, and means for rotating the pivot of said lever about an axis substantially parallel

to the normal position of said vibratory means to rotate said lever and place either stylus in operative position.

15. In a phonograph reproducer, the combination with vibratory means and a floating weight, of a stylus lever pivotally connected to said weight, a stylus projecting from each of two surfaces of said lever, connections between said vibratory means and said lever, and means for rotating the pivot of said lever about an axis substantially parallel to the normal position of said vibratory means to rotate said lever and place either stylus in operative position.

16. In a device of the class described, in combination, a stylus lever, styli projecting therefrom, a member by which said lever is carried, and means by which said member is supported for rotation about an axis extending longitudinally of said lever, said supporting means being provided with stops adapted to limit said member in its rotation, substantially as described.

17. In a device of the class described, in combination, a stylus lever, styli projecting therefrom, a member by which said lever is carried, means by which said member is supported for rotation about an axis extending longitudinally of said lever, said supporting means being provided with stops adapted to limit said member in its rotation, and means for holding said member in adjusted position, substantially as described.

18. In a device of the class described, the combination with vibratory means, of a stylus lever connected to said vibratory means, a plurality of styli projecting therefrom, means for rotating said lever about an axis extending longitudinally thereof to place either stylus in operative position, and means for resisting movement of said rotating means away from the position corresponding with the engagement of either of said styli with the record, substantially as described.

19. In a device of the class described, in combination, a stylus arm or lever, a plurality of styli projecting therefrom, a member by which said arm or lever is carried, and means by which said member is mounted for rotation about an axis extending longitudinally of said lever, substantially as described.

This specification signed and witnessed this 20th day of May 1909.

FRANK L. DYER.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.





AUDIOMETER.

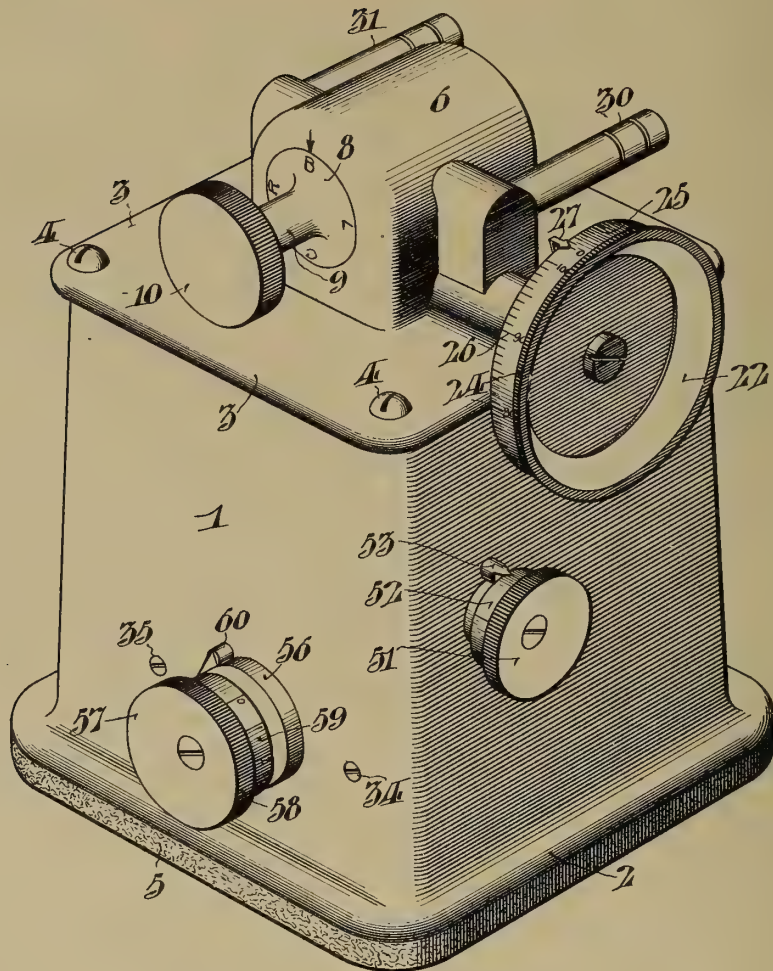
# 1,127,908 - J. M. Mc Callie,  
Patented-Feb 9, 1915.  
Filed----May 3, 1912.

J. M. McCALLIE.  
 AUDIOMETER.  
 APPLICATION FILED MAY 3, 1912.

1,127,908.

Patented Feb. 9, 1915.  
 3 SHEETS—SHEET 1.

FIG. 1.



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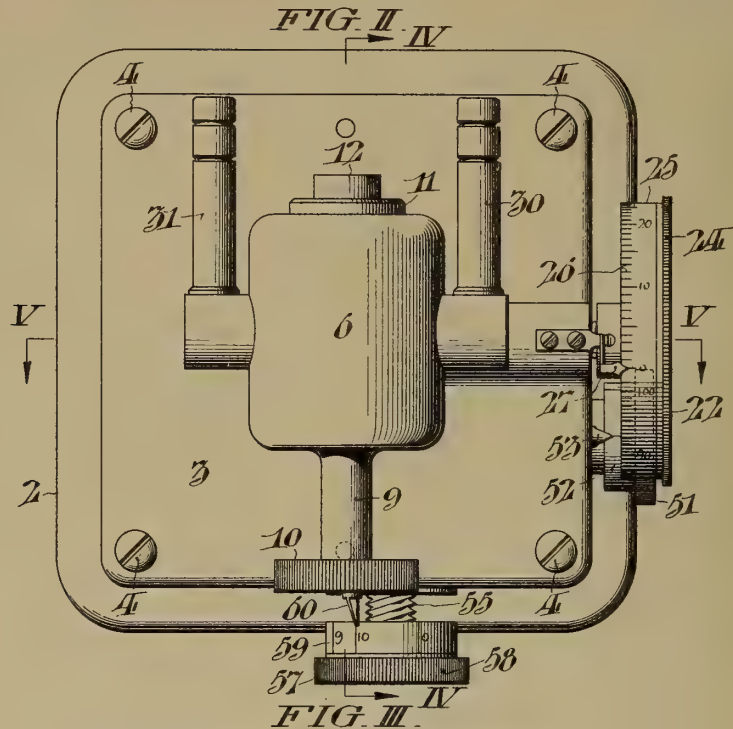


J. M. McCALLIE.  
 AUDIOMETER.  
 APPLICATION FILED MAY 3, 1912.

1,127,908.

Patented Feb. 9, 1915.

3 SHEETS—SHEET 2.



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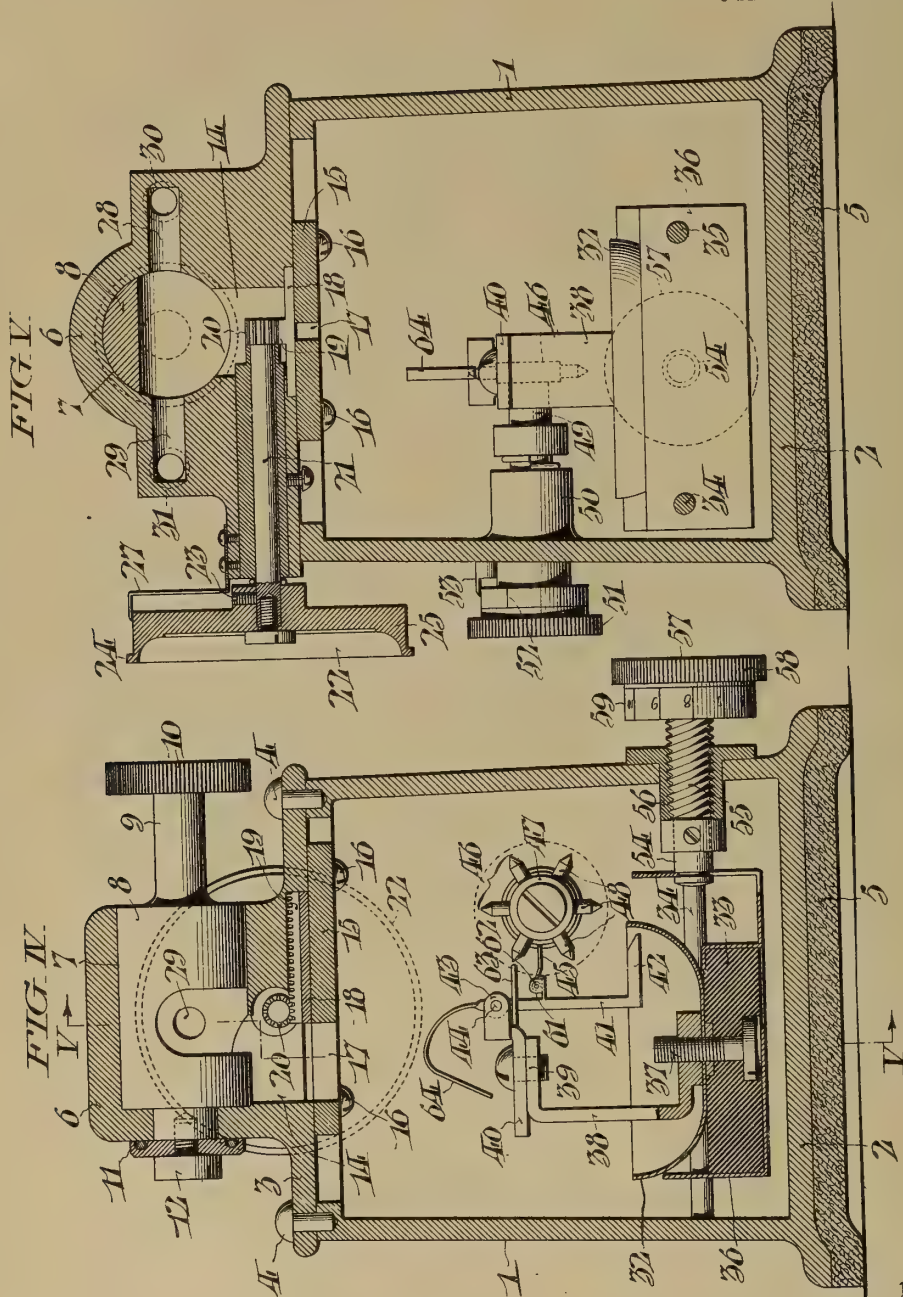


J. M. McCALLIE.  
 AUDIOMETER.  
 APPLICATION FILED MAY 3, 1912.

1,127,908.

Patented Feb. 9, 1915.

3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

JOSEPH M. McCALLIE, OF TRENTON, NEW JERSEY.

## AUDIOMETER.

1,127,908.

Specification of Letters Patent.

Patented Feb. 9, 1915.

Application filed May 3, 1912. Serial No. 694,992.

*To all whom it may concern:*

Be it known that I, JOSEPH M. McCALLIE, of Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Audiometers, whereof the following is a specification, reference being had to the accompanying drawings.

The invention relates more particularly to improvements in audiometers such as shown and described in my prior Letters Patent No. 862,501, granted August 6th, 1907, which is especially adapted to test the acuteness of the human hearing, and to enable comparisons with results in individual cases with a predetermined standard.

An object of the invention is to provide an audiometer of the above character with a sound-emitting device which consists of a sonorous body which may be vibrated by a striker, in which the blow of the striker is uniform.

A further object of the invention is to provide means whereby the blows of the striker may be varied individually; or a series of varying blows may be produced, or a series of uniform blows may be maintained, of any degree of intensity within the limits of adjustment.

These and other objects will in part be obvious, and will in part be hereinafter more fully described.

In the drawings which show by way of illustration one embodiment of the invention, Figure I, is a perspective view of an audiometer embodying my improvements. Fig. II, is a top plan view of the same. Fig. III, is a bottom plan view of the cover and the parts carried thereby. Fig. IV, is a sectional view on the lines IV, IV, of Fig. II. Fig. V, is a sectional view on the line V, V, of Figs. II, and IV.

Referring in detail to the drawings, the audiometer as herein illustrated consists of a main casing 1, which is formed with a base 2, and a cover 3, which may be secured by suitable screws 4, to the main or body portion of the casing. Said casing is preferably mounted on a sound-deadening felt mat 5.

The cover is formed with an extension 6, which is located centrally thereof, and said extension is provided with a cylindrical chamber 7, in which is mounted a cylindrical valve 8. This valve, as herein shown,

is formed integral with a stem 9, to which is attached a hand wheel or actuating disk 10. The valve is held in place by a washer 11, which is attached to the end of the valve by a screw 12. A spring 13, may be interposed between the washer 11, and the outer face of the extension 6, to maintain the valve in any desired adjusted position. A passage 14, connects the cylindrical valve chamber 7, with the interior of the main casing 1. A plate 15, is secured by screws 16, to the under face of the cover, and said plate 15, is provided with a triangular port or passage 17, (see Fig. III), which registers with the passage 14, leading to the cylindrical valve chamber. A slide 18, is mounted in a suitable guideway formed in the under face of the cover, and is held in place by the plate 16. The slide is formed on its upper face with a rack 19, which is engaged by a pinion 20. Said pinion 20, is carried by a short shaft 21, which is journaled in a sleeve carried by the cover, and an actuating disk 22, is secured to the outer end of the shaft 21, by a screw 23. Said actuating disk is formed with a serrated portion 24, whereby said actuating disk may be readily turned. Said disk is also provided with a smooth surface 25, which is provided with a scale 26, see Fig. I. A pointer 27, secured by suitable screws to the cover, is disposed adjacent the scale 26, and serves as a means for determining the position of the actuating disk. By manipulating the said disk, the shaft 21, will be turned, and this shaft will cause the slide 18, to more or less cover the port 17. In other words by the manipulation of the slide 18, the port 17, may be progressively covered or uncovered.

The extension 6, is provided with passages or ports 28, and 29, which lead from the cylindrical chamber 7, controlled by the cylindrical valve 8. These passages 28, and 29, connect with nipples 30, and 31, to which may be removably attached the rubber tubing of the usual binaural device. These parts are in the main similar to those shown and described in connection with my prior patent, and further description thereof, or the manner of using the same, is not thought necessary.

The sound-emitting device consists of a sonorous piece of metal 32, which as herein shown is in the form of a bell. The bell is



mounted on sound-insulating material 33, which may be of rubber or the like. Extending from one side of the casing to the other are rods 34, and 35. A carriage 36, preferably of metal, is suspended on the rods 34, and 35, and is free to slide thereon. The sound-insulating material 33, is carried by the carriage 36, and, therefore, the bell 32, is supported by the metal frame, but is insulated therefrom. A screw 37, passes through the insulating material, and a bracket 38, is threaded on to said screw and clamps the bell against the insulating material.

The bracket 38, is provided with an overhanging extension 39, to which is clamped an adjustable arm 40. The striker 41, as herein shown, is L-shaped, and is so disposed relative to the bell that the free end 42, may strike the bell adjacent its outer rim. The striker is pivotally supported between suitable ears 43, carried by the arm 40, the pivotal support being indicated at 44. The vertical arm of the striker is provided, on what may be termed its front face, with a lug 61, on which a finger 45, is mounted upon a transverse hinge 62, so as to be capable of turning upwardly, but stopped by contact with the end of the lug 61, from turning downwardly, below the horizontal, which is its normal position, as indicated in Fig. IV. A stop or guard 63, mounted beneath the ears 43, limits the upward movement of the finger 45. The striker may also be provided with an overhanging and rearwardly projecting arm 64, which may be bent into any desired relation to the other parts, to vary the momentum of the striker, or determine its normal position of rest.

Located so as to engage the finger 45, is a star-shaped pinion 46, which consists of a central head 47, and outwardly projecting spaced arms 48. When this pinion is rotated, the arms one after another will strike the finger 45, carried by the striker, and will swing the end of the striker away from the bell. As soon as the arm of the pinion passes, or slips off from the finger carried by the striker, the weight of said striker will cause the same to strike the bell and swing back to normal position.

The operating pinion 46, is rigidly secured on the inner end of a short shaft 49, which extends through the casing and is journaled in a suitable bearing 50, carried by the casing. The outer end of the shaft is provided with an actuating disk 51, whereby said shaft may be turned. Said disk 51, is formed with a serrated portion, and also with a smooth portion, on which may be placed a scale 52. A pointer 53, carried by the casing, coöperates with the scale to indicate the position of the arms of the star-shaped pinion carried thereby.

The carriage for the bell and its striker is attached to a shaft 54, in such a manner that the shaft may be freely turned, but at the same time the longitudinal movement of the shaft will cause the frame to slide on the supporting rods 34, and 35, therefor. Said shaft is formed with a thread 55, which coöperates with a thread formed in a sleeve 56, carried by the casing. Said shaft on its outer end is provided with an actuating disk 57, which is formed with a serrated portion 58, and a smooth portion 59, carrying a scale. A suitable pointer 60, is carried by the casing, and coöperates with the scale, in order to indicate by any desired scale, the position of the striker relative to its actuating device.

In the operation of my device, the sound vibrations are created within the chamber of the inclosed casing 1, by the rotation of the actuating disk 51, which causes the star-shaped pinion 46, carried thereby to swing the striker away from the bell and release the former, so that it may swing by gravity into contact with the bell. It will be readily understood that when the finger 45, is in a predetermined position relative to the contacting arm 48, of the actuating pinion, the said striker will be swung a uniform distance away from the bell, and that the force of the striker against the bell for each stroke will be uniform, and, therefore, the sound vibrations will be of uniform intensity.

When it is desired to change the intensity of the vibrations, the actuating device 57, may be turned so as to move the bell and striker, and consequently the finger 45, toward or from the actuating star-shaped pinion 46. This adjustment of the finger with relation to the contacting arms 48, of said pinion, varies the distance that the striker is swung away from the bell, before being released by said arm, and the force of the blow against the bell will thereby be varied, and consequently the intensity of the sound will be varied. The finger may be progressively adjusted, to produce a series of varying blows, or maintained in any given position to produce a series of blows of uniform intensity.

The purpose of hinging the finger 45, is to obviate injury through the turning of the star pinion 46, in the wrong direction, as in such case the hinge will permit the finger to turn upward during the passage of the arms 48. The stop 63, however, limits this upward movement of the finger 45, and prevents it from being thrown backward into a position from which it could not readily drop back again into its normal place.

It will be obvious, that I have provided a sound-emitting device, whereby the intensity of the vibrations of the sonorous



metal may be maintained uniform for any given series, and wherein said device may be so adjusted as to vary the intensity.

The tubular connections are made with the binaural device in the usual manner, and the sound from the chamber in the main casing may be directed either to the right or left ear, or both, by the manipulating of the actuating disk or hand wheel 10, so as to vary the position of the cylindrical valve 8. If the valve is turned so as to close the passage 28, then the sound will pass entirely through the passage 29, while, on the other hand, when the passage 29, is closed, the sound will be delivered through the passage 28. Again, if the valve is positioned as shown in Fig. V, both the passages 28, and 29, are in communication with the main chamber of the casing. When it is desired to vary the size of the passage leading from the main chamber to the cylindrical valve chamber, the actuating disk 22, may be turned so as to progressively shut off or close the port 17, connecting these two passages.

It is obvious that minor changes in the details of the construction and the arrangement of parts may be made, without departing from the spirit of the invention, as set forth in the appended claims.

In the particular embodiment shown, the bell and its striker are mounted together upon a common support, so that the adjusting movement of the striker is attended by actual movement of the bell. While this organization is convenient, I of course do not limit my broader claims thereto, as obviously it may be varied without affecting the underlying principle of operation. Having thus described my invention, I claim:

1. In an audiometer, the combination with a casing providing a substantially closed sound chamber, of a sonorous body mounted therein; means, extending through the wall of said chamber and adapted to actuate said striker from without, to intermittently strike said sonorous body and produce sound vibrations within said chamber; means to adjust the operative blow of said striking means; and means, communicating with the sound chamber and constituting a passage for the discharge of said sound vibrations therefrom.

2. In an audiometer, the combination, with a casing providing a sound chamber; of a sonorous body mounted therein; means extending through the wall of said chamber and adapted to be actuated from without, to intermittently strike said sonorous body and produce sound vibrations within said chamber; means to adjust the operative blow of said striking means; a scale on said adjusting means, to denote the extent of said adjustment; and means constituting a pas-

sageway for the discharge of sound vibrations from said sound chamber.

3. In an audiometer, the combination, with a casing providing a substantially closed sound chamber; of a sonorous body mounted therein; and means, extending through the wall of the chamber and adapted to be actuated from without to intermittently strike said sonorous body and produce sound vibrations within said chamber, said means including a device for producing sound vibrations of substantially a determined intensity.

4. In an audiometer, the combination, with a casing providing a substantially closed sound chamber; of a sonorous body mounted therein; a striker therefor; and means extending through the wall of the chamber, and adapted to be actuated from without, for intermittently swinging said striker to a determined extent.

5. In an audiometer, the combination, with a casing providing a substantially closed sound chamber; of a sonorous body mounted therein, a striker therefor, means extending through the wall of the chamber, and adapted to be actuated from without, for intermittently swinging said striker to a determined extent; and means whereby the position of the striker relative to the actuating device may be varied for varying the intensity of the sound vibrations.

6. In an audiometer, the combination, with a casing providing a substantially closed sound chamber; of a sonorous body mounted therein; a striker for vibrating said sonorous body; an actuating device for said striker; and means for adjusting said sonorous body and striker relatively to the actuating device, whereby the stroke of the striker may be varied.

7. In an audiometer, the combination, with a casing providing a substantially closed sound chamber; of a sonorous body mounted therein; a striker for vibrating said sonorous body; an actuating device for said striker; and means for adjusting said sonorous body and striker relative to the actuating device, whereby the stroke of the striker may be varied, said means including a threaded shaft and coöperating sleeve, whereby the parts may be held in adjusted positions.

8. In an audiometer, the combination, with a casing providing a substantially closed sound chamber; of a sonorous body mounted therein; a striker for vibrating said sonorous body; an actuating device for said striker; means for adjusting said sonorous body and striker relative to the actuating device, and thereby vary the stroke of the striker, said means including a threaded shaft and coöperating sleeve, whereby the parts may be held in adjusted positions; and a scale for indicating said various adjustments.

9. In an acoumeter the combination with  
a casing providing a substantially closed  
sound chamber, of a sonorous body mounted  
therein, means extending through the wall  
5 of said chamber and adapted to be actuated  
from without to intermittently strike said  
sonorous body and produce sound vibrations  
within said chamber, means to adjust the  
operative relation of said sonorous body and  
10 striker, means communicating with said  
sound chamber and constituting a passage-  
way for the discharge of said sound vibra-  
tions therefrom, and a plurality of sound  
discharge ports in the wall of said passage-  
15 way.

10. In an acoumeter the combination with  
a casing providing the sound chamber, of a  
sonorous body mounted therein, means ex-  
tending through the wall of said chamber

and adapted to be actuated from without to 20  
intermittently strike said sonorous body and  
produce sound vibrations within said cham-  
ber, means to adjust the operative relation  
of said sonorous body and striker, a scale 25  
on said means to denote the extent of said  
adjustment, means constituting a passage-  
way for the discharge of sound vibrations  
from said sound chamber, and a plurality  
of sound discharge ports in the wall of said  
passage-way. 30

In testimony whereof, I have hereunto  
signed my name at Philadelphia, Pennsyl-  
vania, this twenty-seventh day of April,  
1912.

JOSEPH M. McCALLIE.

Witnesses:

JAMES H. BELL,  
E. L. FULLERTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

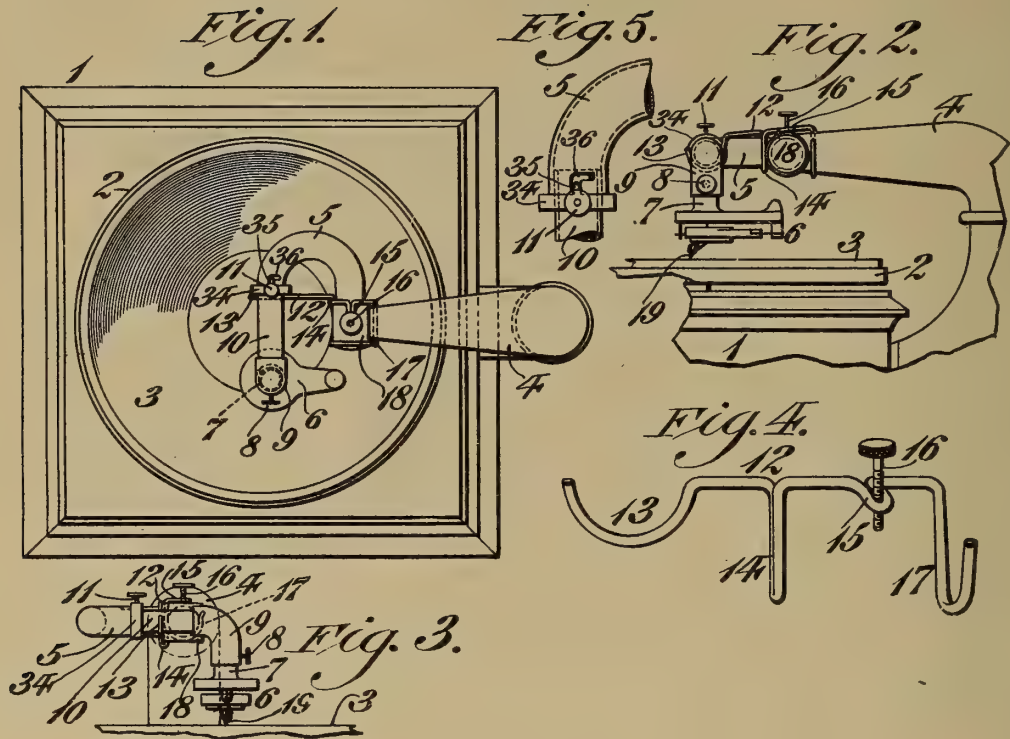
ATTACHMENT FOR TALKING MACHINES.  
# 1,128,021, - C. S. Mc Nally,  
Patented-Feb 9, 1915.  
Filed-April 22, 1914.



C. S. McNALLY.  
ATTACHMENT FOR TALKING MACHINES.  
APPLICATION FILED APR. 22, 1914.

1,128,021.

Patented Feb. 9, 1915.



WITNESSES

*L. Douville,*  
*W. F. Nagle.*

INVENTOR  
*Charles S. McNally.*  
BY *Wiedersheim & Garbancs.*  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

CHARLES S. McNALLY, OF PHILADELPHIA, PENNSYLVANIA.

## ATTACHMENT FOR TALKING-MACHINES.

1,128,021.

Specification of Letters Patent.

Patented Feb. 9, 1915.

Application filed April 22, 1914. Serial No. 833,627.

*To all whom it may concern:*

Be it known that I, CHARLES S. McNALLY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Attachment for Talking-Machines, of which the following is a specification.

My invention consists of an attachment for supporting a sound-box of the type employed in talking machines operating with records having the so-called "hill-and-valley" sound-grooves, such as the Edison records, upon the tone-arms of talking machines normally operating with records having a laterally waving sound-groove, such as the Victor and Columbia records, so as to adapt such latter type machines to operate with an Edison sound-box upon Edison records.

It further consists of means for adjusting the sound-box upon such machines in its relation to the records.

It further consists of other novel features of construction, all as will be herein-after fully set forth.

The annexed drawing and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings—Figure 1 represents a plan view of a Victor talking machine, illustrating an Edison sound-box and record applied to the same. Fig. 2 represents a side-elevation of as much of such machine as will illustrate the application of my device. Fig. 3 represents an end view of said parts. Fig. 4 represents a detail view of the attachment. Fig. 5 represents a detail view of a device for connecting the elbow-tube supporting the sound-box with the goose-neck.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, the reference numeral 1 indicates the casing of a talking-machine having a rotatable turntable, 2, for a disk-record, 3, and a laterally swinging tone-arm, 4. Said parts are substantially alike in machines of the Victor or Columbia type, and operate essentially in the same manner in all machines of these types.

In Figs. 1, 2 and 3 the talking machine is a Victor machine, and the usual goose-

neck, 5, is movably secured to the end of the tone-arm. A sound-box, 6, of the type employed in the Edison talking machine, has its upwardly projecting neck, 7, secured by a set-screw, 8, in the downwardly bent arm, 9, of an elbow-tube, 10, the horizontal arm of which is secured in the outer end of the goose-neck by a collar 34, secured upon the tube by a set-screw, 11, and having a tongue, 35, engaging the L-shaped slot, 36, in the goose-neck by which the Victor sound-box is secured. The support for the sound-box consists of a metal rod or wire, 12, one end of which is bent to form a curved cradle, 13, in which the elbow-tube rests. The rod is bent at right angles and doubled to form a finger, 14, and the portion of the rod which forms a continuation of the rod-portion having the cradle, is bent and doubled in a plane at a right angle to that of the finger to form an ear, 15, in which a fulcrum-screw, 16, is threaded, whereupon the rod is bent parallel with the finger and curved upward to form a hook 17.

When it is desired to reproduce from an Edison or "hill-and-valley" record, such record is placed upon the turntable, and the Edison sound-box has the elbow-tube secured to it and such tube secured to the end of the goose-neck from which the Victor sound-box has been removed. The cradle of the support is placed beneath the elbow-tube and the doubled finger and the hook are placed astride the inner end of the goose-neck, with the hook engaging beneath the tone-arm. The support will thus be fulcrumed with the end of the fulcrum screw resting upon the joint, 18, of the goose-neck and tone-arm, and the weight of the sound-box, elbow-tube and goose-neck is carried by the cradle, as the other end of the lever formed by the support engages beneath the tone-arm, which in this type of machine is vertically immovable. The sound-box is thus carried by the support and the tone-arm, and may be raised and lowered away from and toward the record by the fulcrum-screw to have its jewel-point, 19, or whatever form of needle or stylus device it carries, in proper contact with the record-disk to properly follow the sound-groove. The support thus forms a rigid connection between the sound-box and goose-neck and the tone-arm, so that the downwardly facing diaphragm of the sound-box may be vibrated by the up and

down vibrations of the jewel-point and be amplified by the Victor machine amplifying devices.

By the use of an Edison sound-box and the support preventing vertical movement of the tone-arm, Edison records or similar records of the "hill-and-valley" type may be reproduced on talking-machines of the Victor or Columbia types, so that the amplifying and rotating mechanisms of such machines can be used in reproducing sounds from any make of record.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth, respectively, in the following claims are employed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. An attachment for talking machines, comprising a curved cradle adapted to engage a goose-neck and arms adapted to straddle the inner end of the goose-neck, one of said arms forming a hook to engage around a tone-arm, and also formed with

an ear between said arms, and a fulcrum-screw through said ear and adapted to bear upon the outer end of the tone-arm.

2. In combination with a tone-arm, a gooseneck, and a sound-box having its diaphragm and stylus facing downward, a support adapted to be stationarily supported upon said tone-arm and having a portion adapted to engage and support the gooseneck, and means for unyieldingly raising and lowering the gooseneck supporting portion of such support.

3. In combination with a tone-arm, a gooseneck, and a sound-box having its diaphragm and stylus facing downward, of a tubular elbow adapted to be fitted into the end of the gooseneck and to have said sound-box secured in its other end, a support adapted to be stationarily supported upon the tone-arm and to engage and support the elbow and gooseneck, and means for unyieldingly raising and lowering the elbow and gooseneck supporting portion of such support.

CHARLES A. McNALLY.

Witnesses:

WM. SECLER,  
C. D. McVAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



GRAPHOPHONE PATENT.

TABLET SUPPORT FOR TALKING MACHINES,

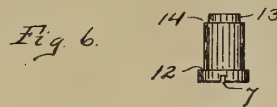
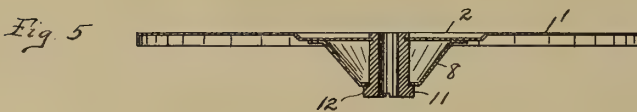
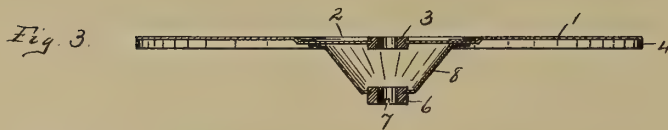
# 1,128,756 - P. Catucci,

Patented-February 16, 1915.  
Filed-September 24, 1914.

P. CATUCCI.  
 TABLET SUPPORT FOR TALKING MACHINES.  
 APPLICATION FILED SEPT. 24, 1914.

1,128,756.

Patented Feb. 16, 1915.



WITNESSES:  
*J. L. Green.*  
*L. H. Gray*

*Pliny Catucci* INVENTOR.  
 BY  
*Louis M. Sanders* ATTORNEYS.

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## TABLET-SUPPORT FOR TALKING-MACHINES.

1,128,756.

Specification of Letters Patent.

Patented Feb. 16, 1915.

Application filed September 24, 1914. Serial No. 863,278.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Tablet-Supports for Talking-Machines, set forth in the following specification.

My invention relates to tablet supports or turn tables for disk talking machines, and has for its principal object, the material lessening in the weight of the structure while at the same time I am able to preserve the requisite strength and stability of the support.

It has been the custom of manufacturers to construct the tablet support of comparatively heavy sheet metal for retaining the support in its original shape. The making of the support of such heavy sheet metal not only necessitates a higher cost for the material because of excessive thickness, but also a higher cost for presses and dies, for the reason that they must be of heavier and stronger material in order to stamp out and press into the desired shape the material of which the support is made. The upkeep of presses and dies amounts to a considerable sum when large quantities of the supports are required to be turned out, and the punches and dies must frequently be repaired and replaced with new ones because of excessive wear upon them.

It has been proposed by some manufacturers to use a lighter material for the tablet support, and during the process of stamping the same into desired shape, to provide the tablet support with a series of radial corrugations. This method has been found objectionable, and particularly because of the wear upon, and necessity for frequent renewal of the tools and dies used in their manufacture. I have found not only from practical experiment, but from experience, that a very much lighter material may be utilized in the making of tablet supports and thereby I am not only able to use lighter and less expensive presses, but lighter and less expensive punches and dies, and at the same time the wear upon the punches and dies is very materially lessened, thereby giving them longer life and permitting longer use without repair or renewal, while at the same time the resulting product has all of the elements of strength and rigidity and

when packed for shipment in quantities is much lighter and costs less for freight or expressage. There is also a tendency among the manufacturers of phonographs and talking machines, toward cheapness in material and the reduction in weight, and a consequent reduction in the cost of product. These conditions make it necessary and even imperative for manufacturers to seek ways and means to reduce the cost of construction and weight of material.

It is therefore the purpose of my invention to accomplish these various results and at the same time produce an article of strength, rigidity and cheapness.

In carrying out my invention, I make use of the structure described in the accompanying detailed description and illustrated in the accompanying drawings, wherein—

Figure 1, is a plan view of a turn table. Fig. 2, is a diametrical section of one form of turn table made in accordance with my improvement. Fig. 3, is a similar section of another form. Fig. 4, is a section similar to Fig. 2, showing the central bearing thimble as an integral piece of metal. Fig. 5, is a section similar to Fig. 3, with the central bearing thimble shown as an integral piece of metal. Fig. 6, is a detached view of the bearing thimble before assembly with the other parts.

Similar reference numerals refer to like parts throughout the specification and drawings.

The turn table as shown in the drawings, must conform to the standards already established, and in my various forms illustrated, it consists primarily of the flat metal disk 1, having a central circular depression 2, with a central bearing thimble 3, rigidly secured to the depressed part 2. At the circumference of the disk 1, is provided a downwardly turned annular flange 4, as shown. This disk may be of any desired or preferred material, as cold, rolled sheet steel, formed by stamping the same from the raw material. In order to strengthen the tablet support when made of such light material, I provide a supplemental disk 5, slightly dished as shown, into a very shallow cone and having a diameter to permit of its forcible insertion within the flange 4, of the disk 1, so that its circumference will bear in the angle formed by said flange with the under face of the disk. In the center of the dished



disk 5, I provide a center bearing thimble 6, with the diametrical slot 7, and having a central aperture in alinement with the central aperture of the bearing thimble 3. The slot 7 is for the purpose of taking over a cross pin in the driving spindle of a talking machine, it being understood that the bearing thimbles 3 and 6 are designed to fit over said spindle.

In Fig. 3, the upper plate or disk 1, with its depression 2, bearing thimble 3, and flange 4, is identical with that shown in Fig. 2. Instead, however, of making use of the shallow cone disk 5, I substitute for it a deeper and smaller cone as 8, and rigidly secure said cone to the central depressed portion of the disk 1, either by riveting, soldering, brazing, or in any desired or preferred way. In this case, the central bearing thimble 6, is secured to the central portion of the cone 8, in alinement with the bearing thimble 3.

In Fig. 4, the general form of the disk is the same as that shown in Fig. 2. In this case, however, I substitute for the two individual bearing thimbles 3 and 6, the central bearing thimble 9, providing such thimble with a shoulder 10, at its lower end for engagement with the central aperture in the disk 5. In this case, as in each of the other cases, the bearing thimble is provided with a cylindrical shoulder at its upper end for engagement with the central aperture in the disk 1. When in place, the metal of the thimble which projects above the face of the disk, is spun down upon, or riveted over the edge of the metal surrounding the aperture so as to rigidly connect the thimble and disk together.

In Fig. 5, I show a structure similar to that shown in Fig. 3, but using a single integral bearing thimble 11. In this case the central part of the cone 8 bears upon the shoulder 12, formed upon the lower end of the thimble, while the upper end 13, of the thimble projects through a slightly smaller aperture in the depressed part 2, after which the projecting end 13, of the thimble is spun down or riveted over the edge of the metal surrounding the aperture as hitherto described.

In Fig. 6, I have shown a detached thimble with the upper portion 13 extended and prepared to receive the apertured disk 1.

It will thus be seen that by forming the tablet support of very light material and strengthening the same by using what may be termed a truss structure, I am able to so strengthen the tablet support as to overcome any objection which might be raised to a support made because of such light and thin material.

In practice, when the forms illustrated in Figs. 4 and 5 are used, the cylindrical part of the thimble between the shoulder 10 or

12 and the upper shoulder 14, is made slightly less than the depth of the cone 5, or the cone 8, so that when the parts are assembled and the cylindrical extension 13 is riveted or spun down over the disk depression 2, the supporting disk 1, and the cone disk 5 or 8 will be forcibly drawn together thereby preventing the parts from separating.

In each of the forms as shown, I may secure, as above indicated, the margin of the shallow cone 5, or the margin of the deeper cone 8, and the under face of the disk 1, by any convenient or desired means, as by soldering, riveting or brazing. In some cases where using either structures illustrated in Figs. 2 or 4, the downwardly extending flange 4, may be spun down over the margin of the disk 5, thereby rigidly connecting the margins of the said disks.

From the above description, it will be seen that I am able to produce a tablet support or turn table for talking machines, much lighter than and yet an article which possesses all the strength and rigidity of heavier tablet supports now in general use, and I at once accomplish all of the results sought in such an article at a minimum of cost and a minimum of expense in maintenance of tools for the construction of the same.

I claim:

1. In a tablet support for talking machines, the combination of a flat, circular disk having a central aperture therein and a dishd or cone shaped disk, and means for firmly securing the margin of the latter disk to the under face of the former disk.

2. In a tablet support for talking machines, the combination of a flat, circular disk having a down turned circumferential flange thereon, and a dishd or cone shaped disk having its margin firmly secured to said flat disk upon the under face thereof.

3. In a tablet support for talking machines, the combination of a flat, circular disk having a central aperture therein, a bearing thimble secured in said aperture and a dishd or cone shaped strengthening disk secured at its margin to the under face of said flat disk.

4. In a tablet support for talking machines, the combination of a flat, circular disk having a marginal down turned flange and a central aperture, a cone shaped disk having its margin forced into engagement with said down turned flange, and a bearing thimble firmly secured in the aperture of said flat disk.

5. In a tablet support for talking machines, the combination of a flat, circular disk of very thin sheet metal, a thin metal cone shaped circular disk, and means for rigidly and concentrically connecting the latter disk to said flat disk.

6. In a tablet support for talking ma-

chines, the combination of a thin, flat, circular sheet metal disk having a marginal down-turned flange thereon, and a central aperture therein, a thin cone shaped sheet metal disk having a central aperture therein, and a tubular thimble secured to and rigidly connecting said disks together.

7. In a tablet support for talking machines, the combination of a very thin, flat, circular sheet metal disk, having a down-turned marginal flange thereon and a central aperture therein, a bearing thimble rigidly secured in said aperture, and a cone shaped strengthening disk firmly secured to the under face of said flat disk within the marginal flange thereon.

8. In a tablet support for talking machines, the combination of a flat, circular disk having a central aperture therein, a cone shaped disk having a central aperture therein, and a tubular bearing thimble secured in said apertures and firmly uniting said disks together with the margin of said cone shaped disk bearing upon the under face of said flat disk.

In testimony whereof, I have hereunto set my hand this 19th day of Sept., 1914.

PLINY CATUCCI.

In presence of—

LOUIS M. SANDERS,

NORMAN E. ZUSI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





Graphophone Patent.

GRAPHOPHONE CABINET,  
# 1,129,790 - L. F. Clawson, Jr.,  
Patented-Feb. 23, 1915.  
Filed-July 9, 1914.

L. F. CLAWSON, JR.  
 GRAPHOPHONE CABINET.  
 APPLICATION FILED JULY 9, 1914.

1,129,790.

Patented Feb. 23, 1915.

Fig. 1

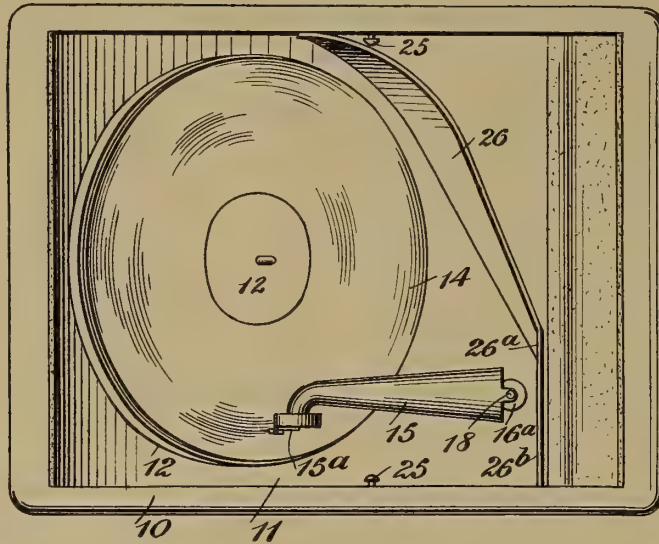


Fig. 3.

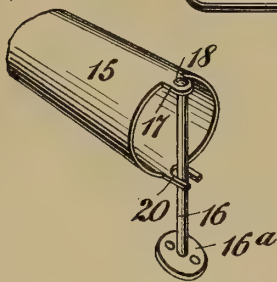


Fig. 4.

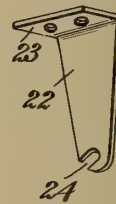


Fig. 2.

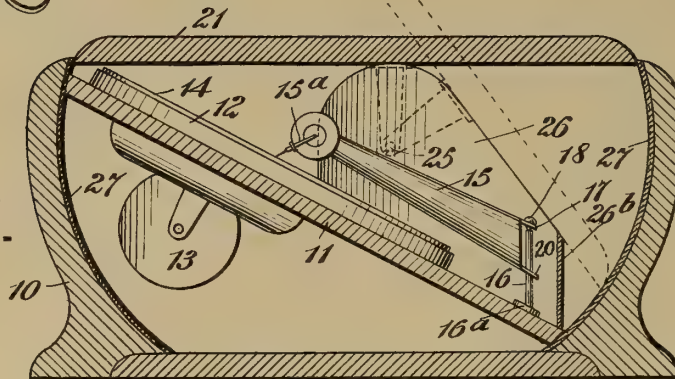
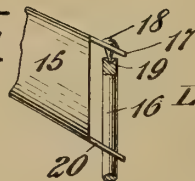


Fig. 5.



WITNESSES

George L. Blume.  
*[Signature]*

INVENTOR

Lewis F. Clawson, Jr.

BY

*[Signature]*  
 ATTORNEYS

# UNITED STATES PATENT OFFICE.

LEWIS FRED. CLAWSON, JR., OF MERCHANTVILLE, NEW JERSEY.

## GRAPHOPHONE-CABINET.

1,129,790.

Specification of Letters Patent. Patented Feb. 23, 1915.

Application filed July 9, 1914. Serial No. 849,920.

*To all whom it may concern:*

Be it known that I, LEWIS F. CLAWSON, Jr., a citizen of the United States, and a resident of Merchantville, in the county of Camden and State of New Jersey, have invented a new and Improved Graphophone-Cabinet, of which the following is a full, clear, and exact description.

My invention relates particularly to a cabinet for disk graphophones, and comprises a cover or lid so combined with the cabinet body and other elements as to be adjustable to form in effect, a horn or sound intensifier in which the tone volume may be governed by the lid to take the place of shutters, doors and the like, which frequently are employed to control the volume.

The invention provides also a construction and arrangement to permit of the changing of the needle without the necessity of turning the reproducer relatively to the tone tube.

Other distinguishing features and advantages will appear in the specific description following.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of my improved cabinet, the lid being removed and the disk and reproducer being indicated; Fig. 2 is a longitudinal vertical section, with the cover in its normal position forming a closure for the cabinet; Fig. 3 is a fragmentary perspective view of the rear end of the tone-tube of the reproducer and its pivot post; Fig. 4 is a perspective view of one form of pivot device that may be employed for mounting the cover; and Fig. 5 is a fragmentary side elevation, partly in section, of a portion of the tone-tube of the reproducer and its pivot post.

In forming a practical embodiment of my invention in accordance with the illustrated example, a body 10 is provided, and disposed therein is a transverse partition 11, disposed diagonally and supporting a turn-table 12, to be actuated by any approved motor 13, here conventionally indicated. The motor serves to turn the table 12 in its own plane at an angle to the horizontal, determined by the inclination of the partition 11 which constitutes a platform on which the said turn-table turns. Any ap-

proved provision may be made for retaining a disk record 14 on the turn-table 12. The tone tube 15 carries the usual reproducer which is provided with any suitable means 15<sup>a</sup> for holding a needle. The tone tube 15 is mounted at one side of the longitudinal center of the cabinet on the platform 11, to swing in a plane parallel with the plane of the turn-table and its platform 11. The rear enlarged end of the rearwardly flaring tone-tube 15 is mounted on a pivot post 16, which may be provided with a foot 16<sup>a</sup> suitably fastened to the upper side of the platform 11. The pivot post 16, it will be seen, is disposed vertically so that it is at an angle less than normal to the plane of movement of the tone-tube and the plane of the platform 11 of the turn-table 12. The tone-tube is permitted a rocking movement relatively to its general plane of movement. The rear end of the said tube is formed with an upper lug or arm 17, which receives a pointed pivot member 18, adapted to rest in a depression 19 in the upper end of the pivot post, while at the bottom of the said tube 15 a forked arm 20 is provided, which straddles the pivot post. With the inclined record support and the described mounting of the tone tube, the tone tube can be swung upwardly through an angle a short distance to bring the needle to a position whereby to permit of the convenient removal and replacing of the needle, without turning the reproducer on the tone tube.

A cover 21 is provided, of an area to effect a closure of the body 10 when the said cover is in position at the top of the body, as indicated in full lines in Fig. 2. The cover is displaceable to occupy a position as indicated in dotted lines in Fig. 2, whereby the cover and partition 11 will be in diverging planes and constitute in effect, horn elements. The means shown for mounting the cover consists of a depending bracket arm 22 at each side having an angular upper end 23 suitably secured to the under side of the cover. The lower end of each depending arm 22 is formed with an oblique slot 24 opening from an edge thereof, the slots being adapted to receive pivot pins 25 projecting from the body 10 at opposite points below the upper edge of the body. The slot and pin pivotal connection permits of the cover being readily removed to afford ready access to the interior. By disposing the piv-



otal point of the cover below the plane of the cover, the latter will be given a bodily swinging movement about the pins 25, so that in being tilted to the position indicated in dotted lines, the rear end of the cover in being depressed within the cabinet body will describe a more rearward path than if the cover had a fixed pivot in the plane of the cover or immediately adjacent to the said plane.

Co-acting with the partition 11 and the displaceable cover in the formation of horn elements, is a second partition 26 above the partition 11 and rising from the latter. The said partition 26 is deflected rearwardly to a point 26<sup>a</sup> adjacent to the reproducer, and may terminate at 26<sup>a</sup>, or may have a continuation 26<sup>b</sup> to the opposite side of the body 10. The upper edge of the partition 26 presents an inclined surface gradually rising from the point 26<sup>a</sup> at one side of the longitudinal center and extending to the opposite side of the body, because of the gradually increasing height of the said partition from the point 26<sup>a</sup>. Thus the said upper edge of the partition 26 will conform to the angular position of the cover 21, and the latter will therefore contact with the partition 26, along the upper edge thereof. The front and back of the body may have a layer of felt 27 at the interior. In any case, I will apply felt or the like to the interior of the back, at the upper portion, to cause a tight fit of the cover when closed.

It will be obvious that with the cover in the tilted position and its lower end depressed to a bearing on the partition 26, these elements and the partition 11 will constitute a sound intensifier and form, in effect, horn elements. Moreover, as the cover may be disposed more or less distant from the top of the inclined element 26, to leave a rearward opening between the said element and the cover, and as the cover at the same time is brought more or less close to the front of the cabinet, it follows that the volume of sound emitted at the front of the cabinet may be varied accordingly.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:

1. The combination with a graphophone cabinet comprising a body, and a platform therein arranged transversely and inclined to the horizontal; of means on said platform to support a graphophone record, a reproducer mounted in the cabinet and disposed above the platform, and a cover above the reproducer and platform, said cover being movable to a position to constitute a closure for the top of the body, or to a tilted position with an end thereof depressed within the body and the opposite end above the top of the body, the cover when in the said tilted position, forming with the platform

and the cabinet walls, a sound-amplifying passage.

2. The combination with a graphophone cabinet, comprising a body having a transverse platform inclined to the horizontal, of means on said platform constituting a support for a graphophone record, a movable member presenting a broad surface, and means for supporting said member in an inclined position above the platform and forming with the latter diverging planes, said member, when in the said inclined position, forming with the said platform and the cabinet walls, a sound amplifying passage.

3. A graphophone and cabinet therefor comprising a cabinet body, a transverse platform therein inclined to the horizontal, a turn-table on the platform adapted to hold a disk record, means for mounting a reproducer to swing above the turn-table in a plane parallel with the latter, a cover, and means to support the cover in position to form a closure for the top of the body, or in an oblique position above the platform to form with said platform, and the walls of the cabinet, a sound amplifying passage.

4. In a graphophone and cabinet therefor, a cabinet body having a platform below the top of the body inclined to the horizontal and forming the bottom of a chamber of gradually increasing height, means for supporting a reproducer above said platform at one side of the longitudinal center of the body, a turn-table on the platform, and a cover pivoted intermediate its ends to tilt at an angle to the horizontal and dispose an end of the cover within the body, and a second partition rising from the platform and ranging from that side of the body opposite the supporting means of the reproducer transversely and rearwardly, the upper edge of the second partition being inclined to correspond with the tilted position of the cover.

5. In a graphophone and cabinet therefor, a cabinet body having a chamber, the bottom of which inclines downwardly toward the rear end, means for supporting a record on said bottom, a reproducer above said bottom, a cover for the body, and means to support the cover in tilted position with the said cover and the said bottom disposed in diverging planes and forming, with the walls of the cabinet, a sound amplifying passage.

6. In a graphophone and cabinet therefor, a cabinet body having a chamber, the bottom of which inclines downwardly from front to rear, means for supporting a record and a reproducer in said chamber, and a cover for said chamber pivoted intermediate its ends to tilt to an inclined position with the rear end depressed within the said chamber, the cover in the depressed posi-

tion and the said bottom of the chamber presenting diverging planes.

5 7. A graphophone cabinet having a chamber, the bottom of which is inclined to the horizontal, said chamber being adapted to accommodate a record and reproducer, and a cover for said chamber displaceable from a position forming a closure of the chamber to a tilted position, the said cover in the tilted position and the bottom of the chamber presenting diverging planes and forming, with the walls of the cabinet, a sound amplifying passage.

10 8. A graphophone cabinet having a chamber, the bottom of which is inclined to the horizontal, said chamber being adapted to accommodate a record and reproducer, and a partition extending from one side of

the chamber transversely and rearwardly toward the opposite side, the said partition being of decreasing height from the first mentioned side of the chamber toward the opposite side, and a cover for said chamber displaceable from a position forming a closure of the chamber to a tilted position, the said cover in the tilted position and the bottom of the chamber presenting diverging planes.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS FRED. CLAWSON, JR.

Witnesses:

HAROLD V. STEVENSON,

WILLIAM WHITAKER CLAWSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





Phonograph Patent.

PHONOGRAPH,  
# 1,129,792 - O. B. Cole,  
Patented-February 23, 1915.  
Filed-July 16, 1914.

O. B. COLE.  
 PHONOGRAPH.  
 APPLICATION FILED JULY 16, 1914.

1,129,792.

Patented Feb. 23, 1915.

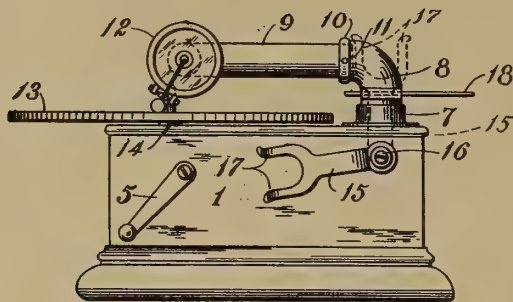


FIG. 1.

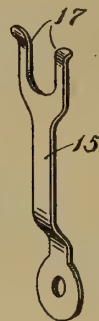


FIG. 2.

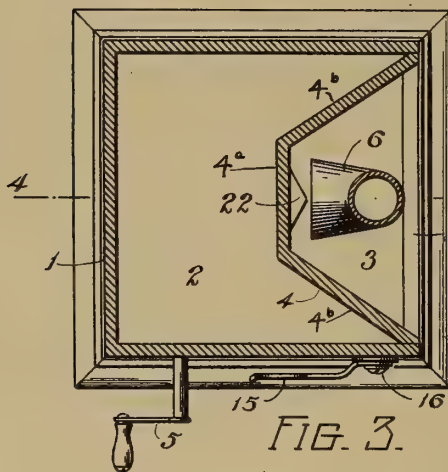


FIG. 3.

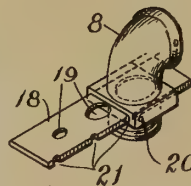


FIG. 7.

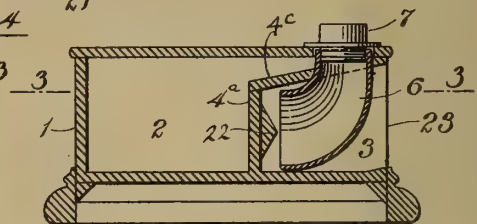


FIG. 4.

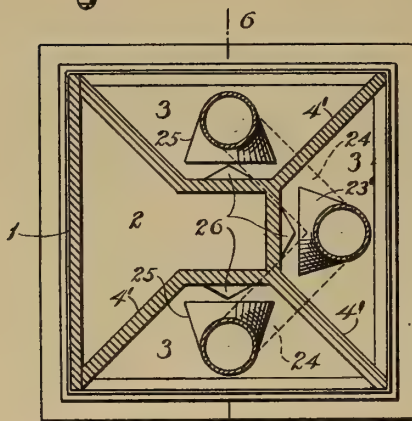


FIG. 5.

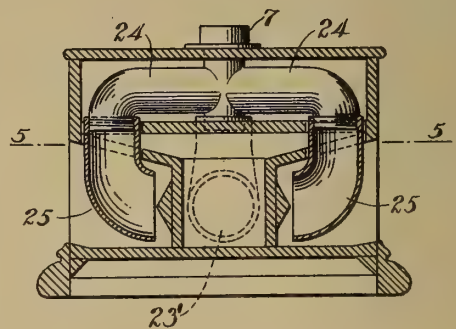


FIG. 6.

WITNESSES:  
*Victoria Londen*  
*Geo B Rawlings.*

INVENTOR:  
 OTTO B. COLE.

BY *Edw Spear Jr.*  
 ATTORNEY.

# UNITED STATES PATENT OFFICE.

OTTO B. COLE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO ARION MANUFACTURING COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

## PHONOGRAPH.

1,129,792.

Specification of Letters Patent. Patented Feb. 23, 1915.

Application filed July 16, 1914. Serial No. 851,386.

*To all whom it may concern:*

Be it known that I, OTTO B. COLE, a citizen of the United States, residing at Boston, county of Suffolk, Commonwealth of Massachusetts, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to phonographs of the class known as hornless phonographs. Such phonographs are not in fact hornless but have the horn or sound amplifier inclosed in a suitable cabinet or casing within the machine. The objectionable scratching noise produced by roughnesses in the record groove and the harsh metallic effects given out by the moving parts of the machine are familiar characteristics of phonographs of this class, and in fact of nearly all phonographs, and tend to largely detract from the quality and timbre of the original tone. To the end therefore of completely reproducing the quality and sweetness of the original tone without the presence of these extraneous mechanical vibrations, I have devised my present invention. In it the cabinet is open on one side and a sound board is located vertically within the cabinet and parallel to the open side. The sound waves are delivered from the reproducer directly against this sound board by a sound conductor having an inwardly directed end entering the cabinet. The sound board has flaring partitions extending outwardly to the lateral edges of the open side of the cabinet and these partitions with the sounding board provide a sound amplifier whereby to direct the sound waves outwardly with increased volume and fidelity of tone. The volume of the reproduced sound is regulated and modulated by a sliding damper arranged in controlling relation within the sound conducting tube. Means are also provided for positively locking the swiveled reproducer arm when said arm is swung away from the record out toward the side of the cabinet.

These and various other features as well as the construction and principle of my invention will be more fully disclosed and discussed in the specification that follows.

In the drawings forming a part of that specification I have shown as illustrative embodiments two forms of phonographs which have proven satisfactory in use.

Throughout specification and drawings

like reference numerals are employed to indicate corresponding parts, and in these drawings:

Figure 1 is an elevation of a phonograph in accordance with my invention, illustrating in full and dotted lines the two positions of the lock for the reproducer arm, Fig. 2 is a detail of the lock detached, Fig. 3 is a plan section of one form of phonograph taken on the line 3—3, of Fig. 4, Fig. 4 is a vertical section on the line 4—4, of Fig. 3. Fig. 5 is a plan section of a modified form of phonograph taken on the line 5—5, of Fig. 6. Fig. 6 is a vertical section on the line 6—6 of Fig. 5, and Fig. 7 is a detail of the tone modulating damper.

I have indicated at 1 the cabinet or casing of a phonograph of the so called hornless type. The cabinet is divided interiorly into two compartments, 2 and 3, respectively, by a sounding board 4. Within the compartment 2 is located the usual motor (not shown) operated by an exposed hand crank 5. Within the compartment 3 is located the delivery end 6 of a sound conductor leading from the reproducer 12 to the sound board 4. The delivery end 6 of the sound conductor is formed as a downwardly and inwardly curved tube located within the cabinet and having an inwardly flared mouth delivering directly against the sound board 4. The upper restricted end of the tube is substantially vertically disposed. This end is screw threaded internally as indicated to receive the external screw threads on one end of a flanged coupling member 7. The opposite end of the coupling member 7 receives and provides a swiveled mount for the lower end of an elbow 8, whereby the elbow may swing laterally. The opposite end of the elbow has a bead over which is slipped one end of a hollow reproducer arm 9. The arm 9 is loosely held at this end by a collar 10 and a set screw 11 which permits the necessary play of the sound box and reproducer 12, carried at the free end of said arm, to compensate for inequalities in the surface of the record. The record is mounted on a suitable turn table 13 revolved by a shaft 14 driven by a motor.

The reproducer arm 9 is adapted to swing laterally away from the record and may be locked in this position by means of the locking device shown in detail in Fig. 2. This lock consists of an arm 15 pivoted at one



end at 16 to the cabinet 1 and forked at its other end at 17 to engage the reproducer arm. The lock normally lies in the full line position shown in Fig. 1. When it is  
 5 desired to lock the reproducer arm so that said arm will not swing back over the record, the lock 15 is swung up vertically to the dotted line position shown in Fig. 1 to bring  
 10 its upper forked end 17 under the reproducer arm so that the forks 17 engage said arm on either side. The locking member 15 will remain in its upright position, by reason of the friction developed at the pivot  
 15 16, and can not be released until the arm 9 is disengaged.

In order to modify the volume of sound passing through the elbow 8, I provide the tone modulator and intensifier shown in detail in Fig. 7. This device may conveniently consist of a damper or slide valve 18  
 20 slidably guided in ways across the throat of the elbow 8. The damper 18 is provided with a plurality of openings 19 of gradually decreasing diameter whereby the volume of  
 25 sound passing through the member 8 may be varied. In using the modulator it is essential that the holes 19 be positively centered relatively to the throat. This is effected in the present invention by means of  
 30 a spring pressed catch member 20 mounted for locking engagement with any notch of a series of locking notches 21 formed in one edge of the damper 18. The tendency of the spring is to project its catch in the path  
 35 of the damper, so that when a notch is moved up opposite to the catch it will be engaged thereby to positively lock the damper in centered position.

The sound board 4 referred to hereinabove consists in Figs. 1 to 4 inclusive of a vertically disposed wall 4<sup>a</sup> arranged within the cabinet parallel to the open side 23 thereof. Extending diagonally from each end of said wall to the lateral edges of said  
 45 open side is an outwardly flaring partition 4<sup>b</sup> which with the wall 4<sup>a</sup> and the upwardly extending wall 4<sup>c</sup> resting on said wall 4<sup>a</sup> defines an outwardly directed amplifier. The delivery end 6 of the sound conductor  
 50 passes through an opening in the wall 4<sup>c</sup> and delivers directly against the vertical sounding board 4<sup>a</sup>. If desired the vertical wall 4<sup>a</sup> may carry a pyramidal or otherwise shaped block 22 directly opposite the  
 55 delivery end of the sound conductor to assist in diffusing the sound waves, although the sound board is effective without this deflector piece. This arrangement of an inwardly delivering sound conductor in combination with a sound board and an outwardly directing amplifier is extremely effective. By it, I am enabled to reproduce the quality and resonance of the original  
 60 tone without the objectionable mechanical sounds usually liberated.

In the form of my invention shown in Figs. 5 and 6, I have shown a slightly modified arrangement of tone clarifying apparatus. In this embodiment, the coupling 7  
 70 is extended downward vertically and connects at its lower end with a sound conductor 23' similar in shape to the amplifier 6 (Figs. 3 and 4). From the sides of the coupling 7 two lateral branch tubes 24 lead. To the free ends of the tubes 24 sound  
 75 conductors 25, similar to the sound conductor 22' are connected. The sound conductors 25 and 23' direct the sound waves in three directions against a resonant sounding board 4' corresponding in function to the  
 80 sounding board 4 but of necessarily different shape. The sound board 4' may if desired be provided with three spreader blocks 26 similar in function and shape to the block 22 in Figs. 3 and 4. The purpose of  
 85 the arrangement shown is the same as that of the arrangement in Figs. 3 and 4. A larger area over which the sound is diffused is provided, however, in the form shown in Figs. 5 and 6. It will be understood that  
 90 the tone modulator 18 is intended to be used in the form shown in Figs. 5 and 6.

Various modifications in the form and construction of my device may obviously be made, all without departing from the spirit  
 95 of my invention if within the limits of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. In a sound producing machine, the  
 100 combination of a cabinet open on three sides, sounding boards vertically disposed therein and parallel to the open sides and flaring deflecting partitions extending from said sounding boards to the edges of the cabinet  
 105 and inwardly directing sound conductors having their delivery mouths disposed in opposition to said sounding boards.

2. In a sound producing machine, the  
 110 combination of a rectangular cabinet open on three sides, sounding boards vertically disposed therein and parallel to said open sides and flaring deflecting partitions extending substantially diagonally from said  
 115 sounding boards to the edges of the cabinet, and inwardly directing sound conductors having their delivery mouths disposed in opposition to said sounding boards.

3. In a sound producing machine, the  
 120 combination of a cabinet open on one side, a sounding board vertically disposed therein and having a spreader surface for diffusing and disseminating the sound waves, a pair of flaring deflecting partitions extending from said sounding board to the edges  
 125 of the cabinet, and an inwardly directing sound conductor having a delivery mouth disposed in opposition to the spreader surface of the sounding board.

4. In a sound producing machine, the 130



combination of a cabinet open on one side, a flat sounding board vertically disposed therein parallel to said open side and having a spreader surface for diffusing and disseminating the sound waves, a pair of flaring deflecting partitions extending diagonally from said sounding board to the edges of the cabinet, and an inwardly directing sound conductor having a delivery mouth disposed in opposition to the spreader surface of the sounding board.

5. In a sound producing machine, the combination of a cabinet, open on one side, a sounding board vertically disposed therein and parallel to said open side, a pair of flaring deflecting partitions extending diagonally from said sounding board to the edges of the cabinet and with the sounding board dividing the cabinet into compartments, an inwardly directing sound conductor having a delivery mouth disposed in one of said compartments in opposition to the sounding board and a motor disposed in an adjacent compartment.

6. In a sound producing machine, a substantially flat sound board, a sound conductor directed toward said board and an oppositely directed amplifier extended from said sound board.

7. In a sound producing machine, a substantially flat vibratory sound board, a sound conductor directed toward said board and an oppositely directed amplifier extended from said sound board past said sound conductor.

8. In a sound producing machine, a cabinet, a substantially flat vibratory sound board therein, a sound conductor having its delivery end disposed in opposition to said sound board, and an oppositely directed amplifier including a pair of flaring partitions extending from said sound board to the edges of the cabinet.

9. In a sound producing machine, a cabinet, a vibratory sound board therein, an inwardly directed sound conductor having its delivery end disposed in opposition to said sound board, and an outwardly directed amplifier including a pair of flaring partitions extending diagonally from said sound board to the edges of the cabinet.

10. In a sound producing machine, an open ended cabinet, a substantially flat vibratory sound board therein, a sound conductor directed against said sound board, and an oppositely directed amplifier extended from said sound board to the inclosing walls of said open side of said cabinet.

11. In a sound producing machine, a cabinet, a vibratory sound board therein, an inwardly directed sound conductor delivering against said sound board, and an outwardly directed amplifier, including substantially flat walls extended from said sound board diagonally to the edges of said cabinet.

12. In a sound producing machine, a substantially flat vibratory sound board carrying a conical spreader, a stationary sound conductor directed toward said board, and an oppositely directed amplifier extending from said sound board.

13. In a sound producing machine, in combination, a cabinet, a substantially flat sounding board therein, a pair of flaring deflecting partitions extending outwardly from said board, a member superimposed upon said sound board and extending outwardly toward the side of the cabinet, and a sound conductor delivering in opposition to said sound board.

14. In a sound producing machine, in combination, a cabinet, a sounding board therein, a pair of flaring deflecting partitions extending diagonally outwardly from said board, a member superimposed upon said sound board and extending outwardly and upwardly toward the side of the cabinet, and a sound conductor delivering in opposition to said sound board.

15. In a sound producing machine, in combination, a cabinet, a sound board vertically disposed therein, a pair of flaring deflecting partitions extending diagonally from said sound board to the edges of the cabinet, and an inwardly directed sound conductor arranged in opposition to said sound board.

16. In a sound producing machine, in combination, a rectangular cabinet, a flat sounding board vertically disposed therein, a pair of flaring deflecting partitions extending diagonally from said sound board to the edges of the cabinet, and an inwardly directed sound conductor arranged in opposition to said sound board.

17. In a sound producing machine, in combination, a rectangular cabinet open on one side, a flat sounding board vertically disposed therein parallel to said open side, a pair of flaring deflecting partitions extending diagonally from said sound board to each lateral edge of the open side, and an inwardly directed sound conductor arranged in opposition to said sound board.

18. In a sound producing machine of the cabinetted horn type; the combination of a substantially flat vibratory resonator and a sound conductor arranged in opposition thereto and an amplifier extending therefrom.

19. In a sound producing machine, a cabinet, and a built in horn structure therein having a substantially flat vibratory sound board at the end thereof and an inwardly directed sound conductor opposed thereto.

20. In a sound producing machine, in combination, a cabinet, a built in horn structure including a straight walled reflecting chamber having a transverse flat sound board at its inner end and an inwardly directed sound conductor within said chamber and having

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its delivery end opposite to said sound board.

21. In a sound producing machine, a cabinet, a substantially flat outwardly directing vibratory sound board therein and a built in horn structure including an inwardly directed sound conductor arranged in opposition thereto.

22. In a sound producing machine, a cabinet having a horizontal partition, sound producing means located above said partition, a

substantially flat board within said cabinet below the partition, a sound conductor directed toward said sound board, and an oppositely directed amplifier extended from said sound board.

In testimony whereof I affix my signature in presence of two witnesses.

OTTO B. COLE.

Witnesses:

GEORGE B. RAWLINGS,  
AGNES V. O'CONNELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



GRAPHOPHONE PATENT.

TALKING MACHINE.

# 1,130,099

- W. H. Miller,

Patented-March 2, 1915.

Filed-February 23, 1910.

Patented Mar. 2, 1915.

# UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE.

1,130,099.

Specification of Letters Patent. Patented Mar. 2, 1915.

Application filed February 23, 1910. Serial No. 545,271.

*To all whom it may concern:*

Be it known that I, WALTER H. MILLER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a description.

My invention relates to talking machines of the type in which the horn or sound conveyer is entirely or chiefly inclosed within a cabinet, and my object is to provide a simple, compact and efficient device of this character.

Other objects of my invention consist in the construction of parts and combinations of elements as will be more particularly pointed out in the following specification and appended claims.

Reference is hereby made to the accompanying drawings, forming part of this specification, and illustrating a preferred embodiment of my invention, and in which—

Figure 1 represents a vertical cross section through a cabinet and inclosed parts taken upon line 1—1 in Fig. 2, some of the parts being shown in side elevation. Fig. 2 is a top plan view of the apparatus shown in Fig. 1; and Fig. 3 is an end elevation looking from the right to Fig. 1.

In all of the above views, the same reference characters will be used to denote corresponding parts.

Referring to the drawings, the inclosing cabinet 1 has formed integrally therewith or attached thereto the horizontal partition 2 above which is mounted the turntable or support for disk records 3. The motor is inclosed within the case 4, which is mounted below partition 2 preferably upon legs 5, which extend upwardly from the bottom 6 of cabinet 1. Turntable 3 is adapted to be rotated by the motor, which rotates vertical spindle 7, said spindle rotating the turntable.

The sound box 8 is provided with diaphragm 9 connected with which is the reproducing stylus 10 which is adapted to track the record grooves of the record supported upon turntable 3. Sound box 8 is carried by a gradually tapering sound conveying tube or tone arm 11, which extends forwardly across the turntable as shown, and thence downwardly through partition 2

in which it is pivotally mounted, as shown, upon vertical pivot pin 12, in order that sound box 8 may be fed across the record. A fixed continuous, gradually tapering sound conveyer or amplifying tube 13 extends from the end of the tone arm 11 downwardly from the same below partition 2, thence rearwardly beneath the partition, whence it curves upwardly as shown at 14 to the rear of partition 2, whence it extends forwardly above the partition to its exit end 15 in the front end wall 16 of cabinet 1. Conveyer 13 is provided with a flanged end 17 secured in partition 2, which flange abuts and forms a close joint with flange 18 upon the lower end of tone arm 11, flanged end 18 sliding upon flanged end 17 as tone arm 11 moves pivotally during the reproduction of the record. It will be seen that the sound conveying means comprising tone arm 11 and amplifying tube 13 is very compact, being doubled back upon itself or wound approximately in the form of a spiral within cabinet 1. It likewise will be seen that partition 2 together with the walls of sound conveyer 13 at the bend 14 entirely separate the portion of the cabinet in which the reproducer is located from that portion beneath partition 2 in which the motor is located, so that the noises caused by the operation of the motor are largely shut out from the sound reproduced and emitted from the sound conveyer. Also, preferably, partition 2 forms the lower wall of that portion of sound conveyer 13 which extends above partition 2, so that, as will be seen, the sound box 8, tone arm 11, and turntable 3 are contained entirely within the exit portion or end of the sound conveyer. If desired, the exit end 15 of the sound conveyer may be provided with a molding 19 formed with fretwork, if desired, to conceal the reproducing mechanism, frame 19 being hinged to cabinet 1 at 20, if the fretwork is used.

It is obvious that tone arm 11 may be fed across the record supported upon turntable 3 either by the co-action of stylus 10 with the record groove, or by any suitable mechanical feed in the well known manner. It is also obvious that while my invention is described in connection with the type of talking machine adapted to operate upon disk records, it may be equally well applied to phonographs adapted to operate upon



cylindrical records, in which case, tone arm 11 might be provided with a telescoping joint or other well known expedient adapted for the purpose, or tone arm 11 might be stationary and a movable mandrel employed. It is also obvious that if desired, the exit end of the horn 13 need not be continued entirely to the opening in the front wall 16 of the cabinet, but might end at a point to the rear of sound box 8, or at any other point in the upper compartment of the cabinet.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a talking machine, the combination of a cabinet, a partition therein, a sound record support mounted above said partition, a reproducer mounted to operate upon sound records on said support, and a sound conveyer having continuous walls connected with said reproducer, said sound conveyer extending below said partition, and having an exit portion above said partition, said partition forming one wall of said exit portion, substantially as described.

2. In a talking machine, the combination of a cabinet, a horizontal partition therein, a sound record support mounted above said partition, a reproducer mounted to operate upon sound records on said support, a sound conveying tube having continuous gradually tapering walls connected with said reproducer and having an exit portion above said partition, said partition forming one wall of said exit portion of said tube, substantially as described.

3. In a talking machine, the combination of a cabinet, a horizontal partition therein, a sound record support mounted above said partition, a motor mounted below said partition, a reproducer mounted to operate upon sound records on said support, a pivoted sound conveying tube carrying and connected with said reproducer, and a sound conveyer forming a continuation of said tube, and having continuous walls extending below said partition, and rising and extending above the same to its exit end, said partition and the walls of said conveyer completely separating said reproducer from said motor, and said partition forming the lower wall of the exit portion of said conveyer, substantially as described.

4. In a talking machine, the combination of a cabinet, a record support therein, a motor for rotating the same, a reproducer and a sound conveyer having continuous gradually tapering walls connected without interruption to said reproducer and extending therefrom to its exit end in the wall of said cabinet, said reproducer being located within a portion of said conveyer and said motor outside said conveyer, substantially as described.

5. In a talking machine, the combination of a cabinet, a record support therein, a motor for rotating the same, a reproducer and a sound conveyer having continuous walls connected thereto extending therefrom to its exit end in the wall of said cabinet, said conveyer doubling back upon itself, the entrance portion thereof extending through the wall of the exit portion, substantially as described.

6. In a talking machine, the combination of a cabinet, a record support therein, a motor for rotating the same, a reproducer and a sound conveyer having continuous gradually tapering walls connected thereto and extending therefrom to its exit end in the wall of said cabinet, said conveyer doubling back upon itself, the exit portion thereof being fixed in position and the inlet portion carrying the reproducer being pivoted to the wall of the exit portion, substantially as described.

7. In a talking machine, the combination of a cabinet, a record support therein, a motor for rotating the same, a reproducer and a sound conveyer connected thereto and having continuous walls extending therefrom to its exit end, and a partition separating said motor from said reproducer and record support, said conveyer extending from said reproducer on one side of said partition thence on the other side of said partition, and thence on the first side of said partition to its exit end, said record support being located substantially entirely in the exit portion of said conveyer, substantially as described.

8. In a talking machine, the combination of a reproducer, a sound conveyer having continuous walls, connected to said reproducer a record support located substantially entirely in said conveyer, and means for rotating said record support, substantially as described.

9. In a talking machine, the combination of a reproducer, a sound conveyer having continuous walls, connected to said reproducer, a record support located in said conveyer, and means extending through a wall of said conveyer for rotating said record support, substantially as described.

10. In a talking machine, the combination of a sound conveyer having continuous walls, sound reproducing means located in the exit portion of said conveyer and having an unbroken sound conveying connection with the walls of said conveyer, and a motor for said machine located outside of said conveyer, substantially as described.

11. In a talking machine, the combination of a rotatable record support, sound reproducing means cooperating with said support, a sound conveyer having continuous walls leading without interruption from said sound reproducing means, and means



for rotating said support, said support and sound reproducing means being located in said conveyer, substantially as described.

12. In a talking machine, the combination 5 of a cabinet, a record support mounted in said cabinet, sound reproducing means in co-operative relation with said support, a sound conveyer having continuous walls connected without interruption to said reproducing means and located within said cabinet, and means for rotating said support, said support being located substantially entirely in said conveyer, substantially as described.

13. In a talking machine, the combination 15 of a cabinet, a record support mounted in said cabinet, sound reproducing means in co-operative relation with said support, a sound conveyer having continuous walls connected without interruption to said reproducing means and located within said cabinet, said support being located substantially entirely in said conveyer, and a motor for rotating said support located outside of said conveyer, substantially as described.

14. A talking machine comprising in combination a horn of the character described having its smaller end bent back upon itself and passing through the wall of the horn, and a sound reproducing apparatus including the usual sound box located in the horn and having a sound conveying connection from its sound box to said smaller end of the horn.

15. A talking machine comprising in combination a horn of the character described having its smaller end bent back upon itself and passing through the wall of the horn, and a sound reproducing apparatus including the usual sound box located in the horn and having a sound conveying connection from its sound box to said smaller end of the horn together with a casing provided with an opening, the horn being placed in said casing with its larger end opposite said opening.

16. A talking machine comprising in combination a horn of the character described having its smaller end bent back upon itself and passing through the wall of the horn, and a sound reproducing apparatus including the usual sound box located in the horn and having a sound conveying connection from its sound box to said smaller end of the horn, together with a casing having an open-

ing in one side wall, the horn being placed 55 in said casing with its larger end connected to the wall around said opening.

17. A talking machine comprising a horn of the character described having its smaller end bent back upon itself and passing 60 through the wall of the horn at a point intermediate of its ends, combined with a sound reproducing apparatus comprising a record supporting and rotating apparatus, sound box and swinging tone arm carrying 65 said sound box, located inside the horn, said swinging tone arm having a swiveling sound conveying connection with the smaller end of the horn.

18. In a talking machine, the combination 70 of a reproducer, a sound conveyer tapering gradually throughout its length and having continuous walls connected to said reproducer, a record support located in said conveyer, and means for rotating said record 75 support, substantially as described.

19. In a talking machine, the combination of a reproducer, a sound conveyer having continuous walls connected to said reproducer and extending throughout their length 80 without sudden change of direction, a record support located in said conveyer, and means for rotating said record support, substantially as described.

20. In a talking machine, the combination 85 of a rotatable record support, sound reproducing means cooperating with said support, a sound conveyer having continuous wall leading without interruption from said sound reproducing means, and means for rotating said support, said sound reproducing means being located in said conveyer, substantially as described.

21. In a talking machine comprising in combination a horn of the character de- 95 scribed having its smaller end bent back upon itself and passing through the wall of the horn, and sound reproducing apparatus including a reproducer located in the horn and connected to the smaller end thereof, 100 substantially as described.

This specification signed and witnessed this 19th day of February 1910.

WALTER H. MILLER.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various stages of human civilization, from the earliest times to the modern era. He also touches upon the different religions and philosophies that have shaped the world. The second part of the book is a detailed account of the life of the author himself, from his childhood to his old age. He describes his travels, his friendships, and his various occupations. The third part of the book is a collection of letters and papers that the author has written over the years. These letters are addressed to his friends and family, and they provide a glimpse into his private life. The fourth part of the book is a series of essays on various subjects, including politics, literature, and science. The author expresses his views on these subjects and discusses the progress of the world. The fifth part of the book is a collection of poems and songs that the author has written. These poems are often inspired by his travels and his experiences. The sixth part of the book is a series of letters that the author has received from his friends and family. These letters provide a glimpse into the lives of the people who were close to the author. The seventh part of the book is a collection of papers and documents that the author has collected over the years. These papers are often of historical interest and provide a valuable record of the world as it was in the past. The eighth part of the book is a series of letters that the author has written to his friends and family. These letters are often of a personal nature and provide a glimpse into the author's life. The ninth part of the book is a collection of papers and documents that the author has collected over the years. These papers are often of historical interest and provide a valuable record of the world as it was in the past. The tenth part of the book is a series of letters that the author has written to his friends and family. These letters are often of a personal nature and provide a glimpse into the author's life.

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THE END OF THE WORLD. BY THE AUTHOR OF "THE HISTORY OF THE WORLD."



GRAPHOPHONE PATENT.

MACHINE FOR SHAVING SOUND RECORDS OR BLANKS.

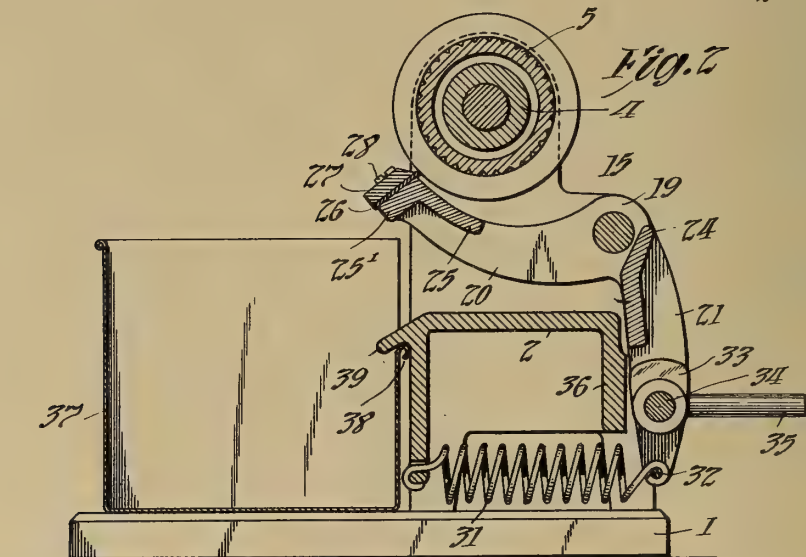
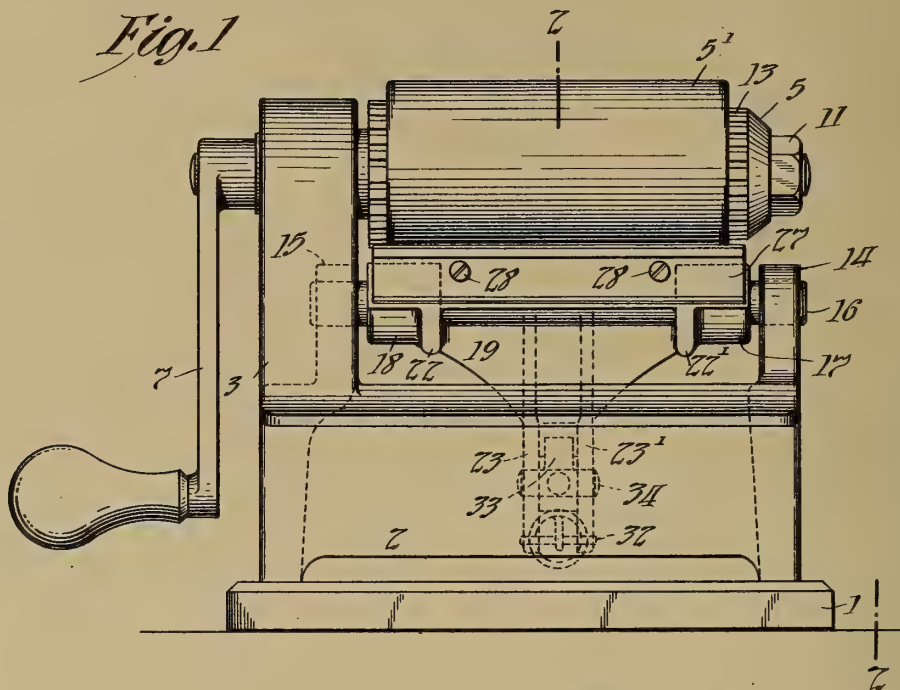
# 1,130,156 - Thomas Alva Edison,  
Patented-March 2, 1915.  
Filed-June 22, 1911.

T. A. EDISON.  
MACHINE FOR SHAVING SOUND RECORDS OR BLANKS.  
APPLICATION FILED JUNE 22, 1911.

1,130,156.

Patented Mar. 2, 1915.

3 SHEETS—SHEET 1.



*Witnesses:*  
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Frederick Bachman.

*Inventor:*  
Thomas A. Edison  
by Frank T. ...  
his Atty.



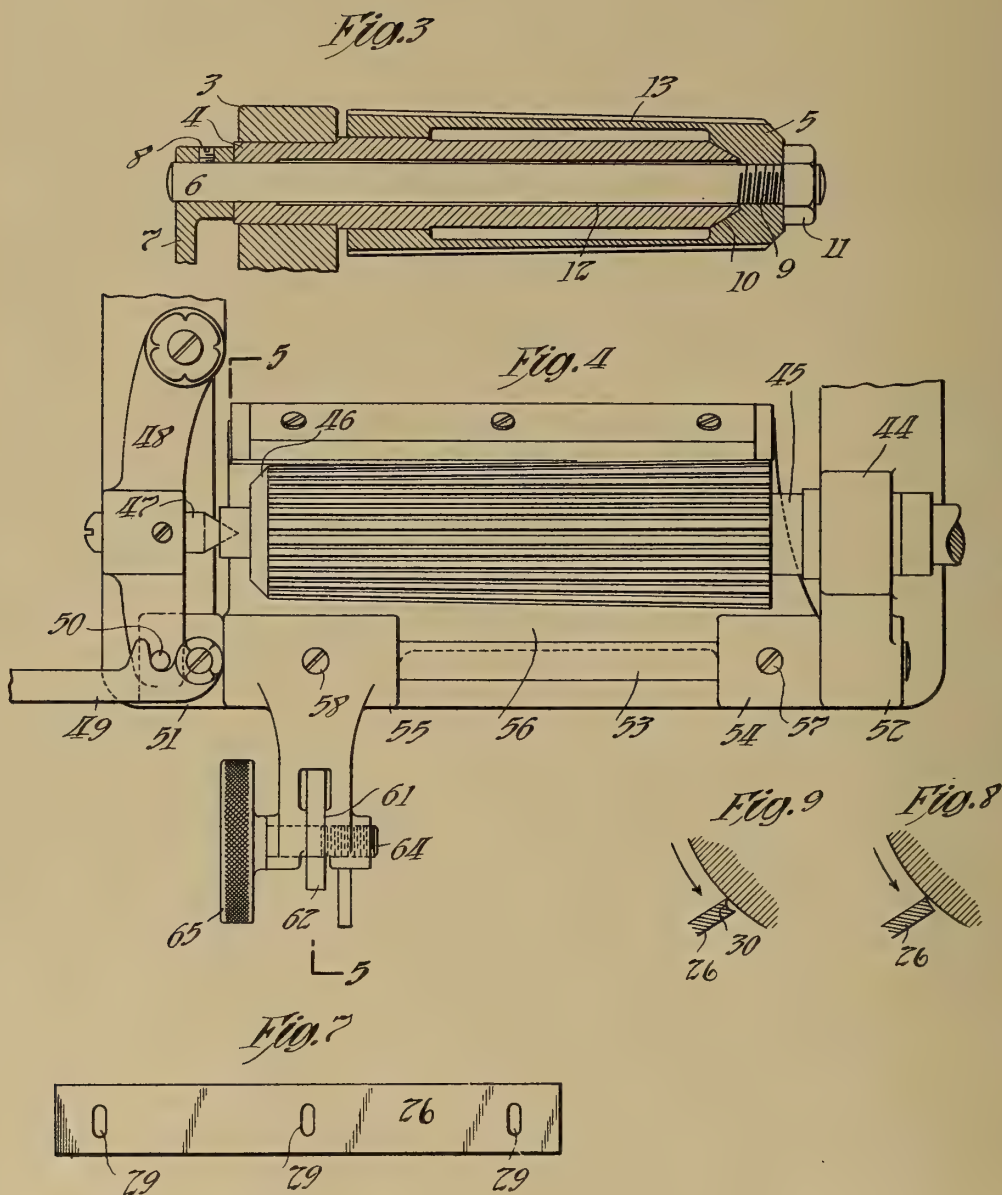


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MACHINE FOR SHAVING SOUND RECORDS OR BLANKS.  
APPLICATION FILED JUNE 22, 1911.

1,130,156.

Patented Mar. 2, 1915.

3 SHEETS—SHEET 2.



*Witnesses:*  
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*Inventor:*  
Thomas A. Edison  
by Frederick L. Ryan  
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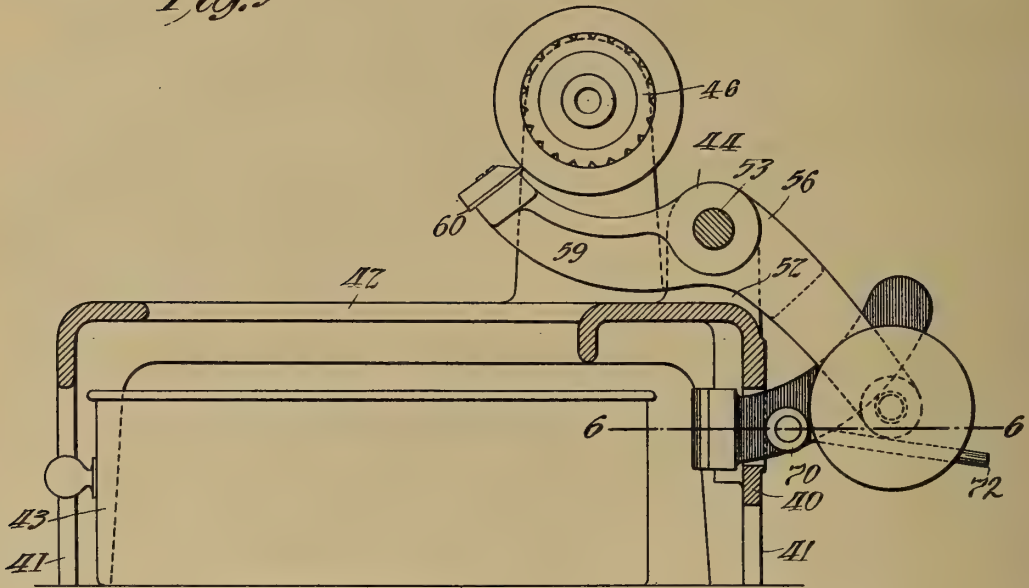
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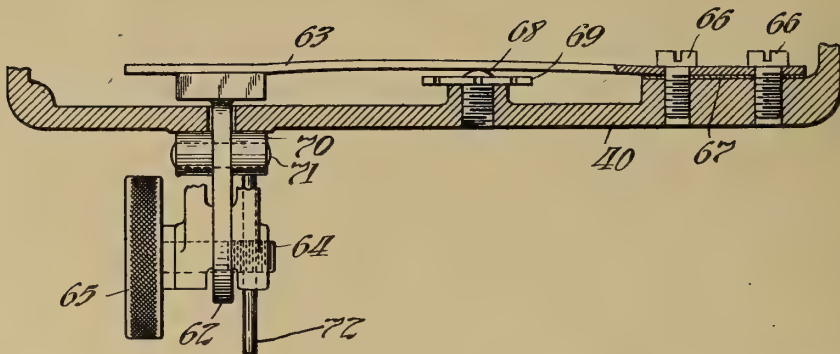
Patented Mar. 2, 1915.

3 SHEETS—SHEET 3.

*Fig. 5*



*Fig. 6*



*Witnesses:*  
Francis D. Hewitt  
Frederick Bachmann

*Inventor:*  
Thomas A. Edison  
by Francis D. Hewitt  
his Atty.



# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR TO  
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION  
OF NEW JERSEY.

MACHINE FOR SHAVING SOUND RECORDS OR BLANKS.

1,130,156.

Specification of Letters Patent.

Patented Mar. 2, 1915.

Application filed June 22, 1911. Serial No. 634,806.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Machines for Shaving Sound Records or Blanks, of which the following is a description.

10 My invention relates to machines for shaving sound records or blanks, particularly, but not exclusively, those of cylindrical form.

15 In shaving machines now in common use, it is customary to provide a narrow knife for turning off the surface of the record or blank. This construction is objectionable owing to the time consumed in turning off the surface and to the necessity for providing more or less complicated mechanism for feeding the knife along the record. Both of these objections are obviated by the employment of a knife extending throughout the length of the record or blank to be shaved, as disclosed in United States Patent No. 457,314, granted to me on August 11, 1891.

20 One of the objects of my present invention is to provide an improved device of this character which is simple, compact and capable of rapid and efficient operation.

25 Other objects are to provide a new and efficient shaving knife and improved means for feeding the knife into the record or blank.

30 Further objects will appear more fully in the following specification and appended claims.

35 In order that my invention may be better understood, attention is directed to the accompanying drawings forming part of this specification and in which:—

40 Figure 1 represents a front elevation of a shaving machine embodying one form of my invention; Fig. 2 represents a cross section thereof taken on the line 2—2 of Fig. 1; Fig. 3 represents a central longitudinal section of the record or blank support and its mounting; Fig. 4 represents a plan view of a modified form of my invention; Fig. 5 represents an end view thereof partly in section on line 5—5 of Fig. 4; Fig. 6 represents

a plan view partly in section taken on line 6—6 of Fig. 5; Fig. 7 represents a plan view of the shaving knife; Fig. 8 represents a cross section of the preferred form of shaving knife; and Fig. 9 represents a similar view of a modified form of the shaving knife.

In all the views like parts are designated by the same reference numerals.

Referring to the drawings and more particularly to Figs. 1, 2 and 3, the base 1 is provided adjacent the forward end thereof with a box-like frame portion 2 from one end of which projects a standard 3, in the upper end of which is rotatably mounted one end of the hollow core 4 of the mandrel 5 for supporting the record or blank 5'. Through the center of the core 4 extends a shaft or rod 6 to one end of which a crank 7 is secured by a set screw 8 or other suitable means. The opposite end of the shaft 6 is threaded as shown at 9 into the outer end of the mandrel 5, the core 4 being firmly held between the crank 7 and the conical portion 10 of the mandrel. A check nut 11 locks the parts of the mandrel and shaft 6 in position. The core 4 preferably engages the shaft 6 only at one end thereof, the remainder of the central aperture therein being preferably formed of slightly greater diameter than the said shaft as shown at 12 in Fig. 3. In order to prevent slipping of the record or blank on the mandrel 5, the latter is formed with ribs 13 or is otherwise suitably roughened on the outer or record engaging surface thereof. By securing the crank 7 directly to the mandrel shaft, it is possible to rotate the mandrel without any lost motion such as is commonly produced by reason of the employment of interconnecting mechanism, such as belts, between the driving means and the mandrel.

Rotatably mounted in the bearing 14 and in the bearing 15 projecting from the standard 3 is a shaft or rod 16 adjacent the ends of which are secured the collars or bosses 17 and 18 on the lever 19. It is, of course, understood that the lever 19 might be rotatably mounted on the rod 16. The lever has an arm 20 extending rearwardly under the mandrel and a downwardly directed arm 21,



each of these arms being formed of two spaced sections, which are indicated at 22 and 22' for the arm 20 and at 23 and 23' for the arm 21, the sections of the lever being  
 5 joined by a web 24 adjacent the pivot 16 and a web 25 adjacent the outer end of the arm 20. The web 25 is provided with a flange 25' extending substantially radially of the mandrel 5, a knife 26 being clamped in po-  
 10 sition on the said flange by the bar 27, which is held in position by means of screws 28, or other suitable securing means, passing through apertures 29 in the knife 26 and threaded into the flange 25'.  
 15 The openings 29 in the knife are preferably elongated transversely of the knife, as shown in Fig. 7, so as to permit adjustment of the knife relatively to the record surface.

I prefer to form the knife with a large  
 20 angle, preferably a right angle, between the surfaces forming the cutting edge thereof (see Fig. 8). This form of knife has more rigidity than the sharp edged knives commonly employed and permits a cut to be  
 25 taken the whole length of the record cylinder without any chattering such as would occur if a knife with a small angle at the shaving edge were employed. This form also permits the employment of all four  
 30 longitudinal edges of the knife for shaving. In Fig. 9, I have shown a modified form of knife having the forward portion thereof ground on a curve 30. While this form of knife has given satisfactory results, I prefer  
 35 to employ the form shown in Fig. 8.

One of the principal features of my invention is the provision of means for automatically feeding the shaving knife into the record material. In the form of my inven-  
 40 tion shown in Figs. 1, 2 and 3, this means comprises a spring 31 secured at one end to the rear downwardly extending wall of the frame 2 and connected at its other end to a pin 32 mounted at its ends in the sections  
 45 23 and 23' of the arm 21 of the knife supporting lever. This spring is given such a tension as to feed the knife into the record material at a rate most suitable for efficient operation of the device. In order to permit  
 50 control of the movement of the lever 19 by the spring 31, a cam 33 is mounted upon a pin or bearing 34 between the sections 23 and 23' of the downwardly extending arm 21 of the lever. A rod 35 secured to the  
 55 cam 33 serves as means to rotate the same. The cam being placed in engagement with the front downward extending wall 36 of the frame 2, the arm 35 may be rotated to cause the knife to be moved at will toward  
 60 or away from the record or blank. The extent of movement of the arm 35 regulates the amount of movement of the knife.

The numeral 37 represents a suitable receptacle adapted to be placed on the base 1  
 65 to receive the chips of shavings from the

record blank. One side of the said receptacle is of less height than the remaining sides and is formed at the upper edge with a bead 38, which is adapted to be placed under the inclined rib 39 projecting from 70 the adjacent end of the frame 2.

In the modified form of my invention shown in Figs. 4, 5 and 6, the base or support 40 is provided with standards or legs 41, the top of the base being formed with an 75 opening 42 through which the shavings from the record or blank are adapted to pass into the receptacle or drawer 43 placed under the base and movable between the legs thereof. Mounted in a bearing 44 on 80 the base or support is a shaft 45 which carries the mandrel 46 on which the record or blank to be shaved is held. As in the modification hereinbefore described, the outer surface of the mandrel is ribbed so as to 85 hold the record or blank against slipping. The free end of the mandrel is supported by an end bearing 47 carried by a pivoted gate 48 in the usual manner. A latch 49 adapted to engage the projection 50 on the 90 gate 48 is pivotally mounted on the upright 51 formed at one end of the base or support. Rotatably mounted in the upright 51 and in the corresponding upright 52 at the opposite end of the frame is a rod 95 53 to which the bosses 54 and 55 on the bell crank lever 56 are secured in any suitable manner, as by screws 57 and 58 respectively. The lever 56 is provided with an arm 59 extending under the mandrel, a knife 60 be- 100 ing adjustably secured to said arm in the manner hereinbefore described. The other arm of the said lever extends forwardly and downwardly and is provided at its lower end with a forked portion 61 within which 105 the sector 62, which is secured to the spring 63, is adjustably held by means of a set screw 64 provided with a knurled head 65. The end of spring 63 opposite that carrying the sector 62 is secured to the base or sup- 110 port by means of screws or other suitable fastening means 66, a washer 67 being inserted between the said spring and the base or support. In order to permit a regula- 115 tion or adjustment of the pull or motive force of the spring 63 on the lever 56, I provide an adjusting device 68 bearing on the forward side of the spring and threaded into the base or support 40, this device being provided with an enlarged disk shape 120 portion 69 for rotating the same. A cam 70 is mounted on the pivot 71 secured to the sector 62 and bears on the forward end of the base or support 40. By rotating the arm 72 secured to the cam 70, the sector 62 and le- 125 ver 56 may be moved either by or against the pull of the spring 63 to adjust the shaving knife relatively to the surface of the record or blank to be shaved. The spring is designed to feed the knife into the record 130



material at the rate necessary for most efficient operation of the knife. The provision of the sector 62 and the means for adjustably securing the same to the lever permits the knife to be adjusted into contact with the record cylinder before the shaving operation is begun so that the shaving will continue during the whole of the throw of the arm 72 from the upper position in contact with the lower end of the lever as shown in Fig. 5 to the lower position in contact with the support for the base 40. The curvature of the cam 70 may be so regulated that by throwing the lever from one extreme position to another, a cut of desired depth will be taken.

It will be seen from the foregoing description that a shaving machine constructed in accordance therewith will be simple in construction and rapid and efficient in operation.

It is furthermore evident, that many modifications may be made in the specific structures shown and described without departing from the spirit of my invention.

What I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, motive means, and an adjustable connection between said motive means and said knife support, substantially as described.

2. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, resilient motive means, and an adjustable connection between said motive means and said knife support, substantially as described.

3. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, a spring, an adjustable connection between said spring and said knife support, and means for regulating the motive force of said spring, substantially as described.

4. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, a spring, a sector secured thereto, and means for adjustably securing said knife support to said sector, substantially as described.

5. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, a spring, a sector secured thereto,

means for adjustably securing said knife support to said sector, and means for controlling the movement of said knife support, substantially as described.

6. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, a spring, a sector secured thereto, means for adjustably securing said knife support to said sector, and a cam for controlling the movement of said knife support, substantially as described.

7. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, a spring, a sector secured thereto, means for adjustably securing said knife support to said sector, means for controlling the movement of said knife support, and means for regulating the motive force of said spring, substantially as described.

8. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a pivoted knife support movable transversely with respect to said record or blank support, motive means, and an adjustable connection between said motive means and said knife support, substantially as described.

9. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a pivoted knife support movable transversely with respect to said record or blank support, a spring, a sector secured thereto, means for adjustably securing said knife support to said sector, means for controlling the movement of said knife support, and means for regulating the motive force of said spring, substantially as described.

10. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, motive means, a member secured thereto, and means for adjustably securing said knife support to said member, substantially as described.

11. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, motive means, a member secured thereto, means for adjustably securing said knife support to said member, and means for controlling the movement of said knife support, substantially as described.

12. In a shaving machine, the combination of a rotatable support for carrying a record or blank, a knife support movable transversely with respect to said record or blank support, motive means, a member secured thereto, means for adjustably securing said knife support to said member, and



a cam for controlling the movement of said knife support, substantially as described.

13. In a shaving machine, the combination of a rotatable support for carrying a  
5 record or blank, a knife support movable transversely with respect to said record or blank support, motive means, a member secured thereto, means for adjustably securing said knife support to said member, means  
10 for controlling the movement of said knife

support, and means for regulating the motive force of said motive means, substantially as described.

This specification signed and witnessed this 20th day of June 1911.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

PHONOGRAPH.

# 1,130,173 - E. M. Kellogg,  
Patented-March 2, 1915.  
Filed-April 15, 1912.

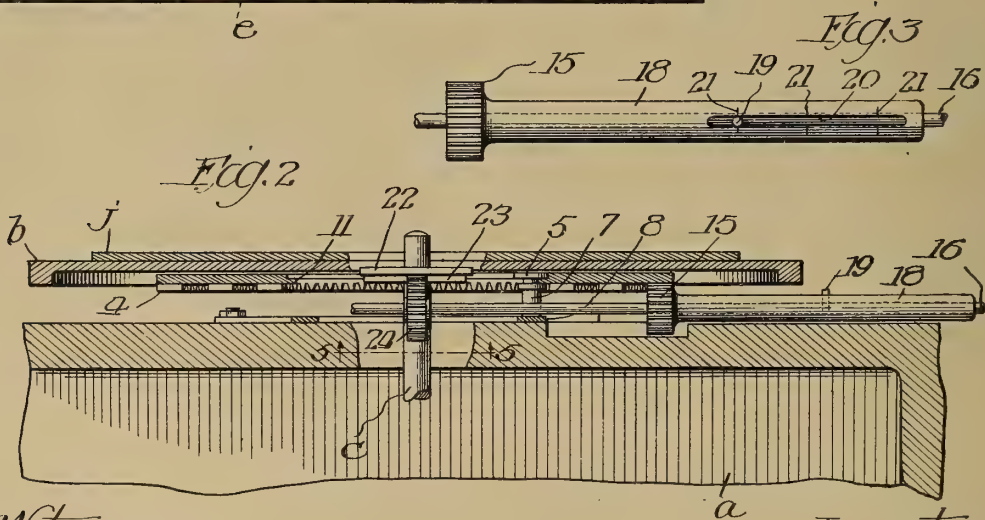
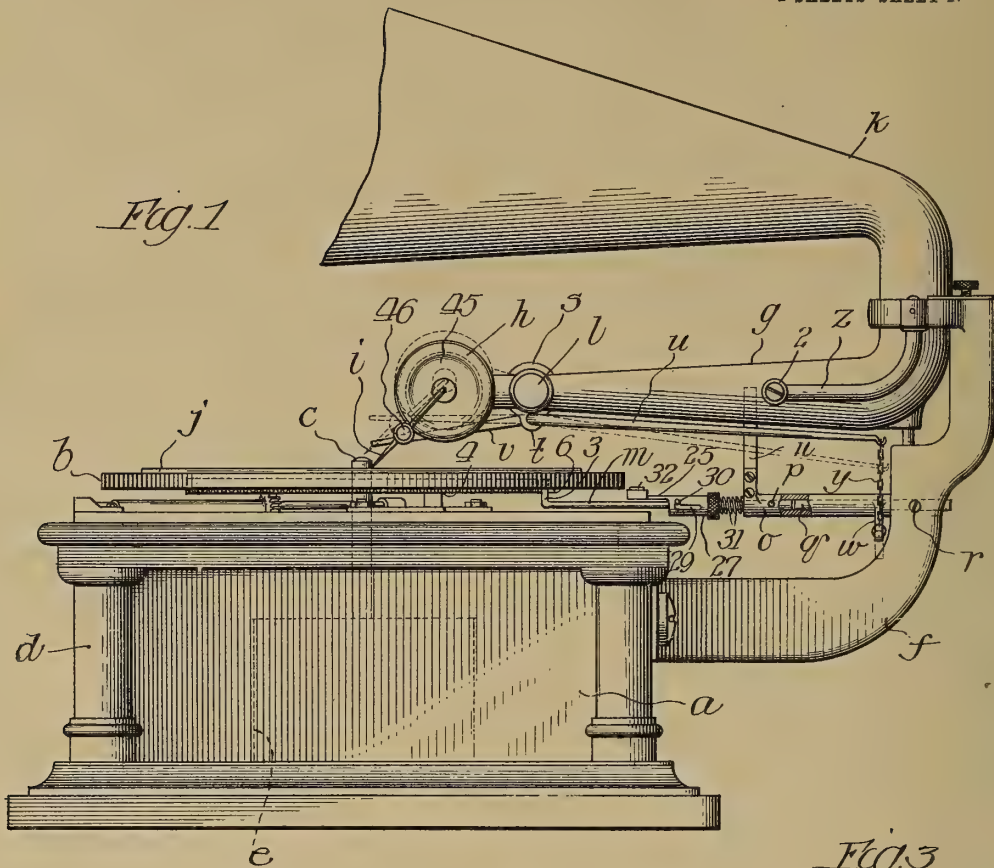
E. M. KELLOGG.  
PHONOGRAPH.

APPLICATION FILED APR. 15, 1912.

1,130,173.

Patented Mar. 2, 1915.

2 SHEETS—SHEET 1.



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Jennie L. Liske

Inventor:  
Edwin M. Kellogg  
By Harry Invin Promer  
Atty's



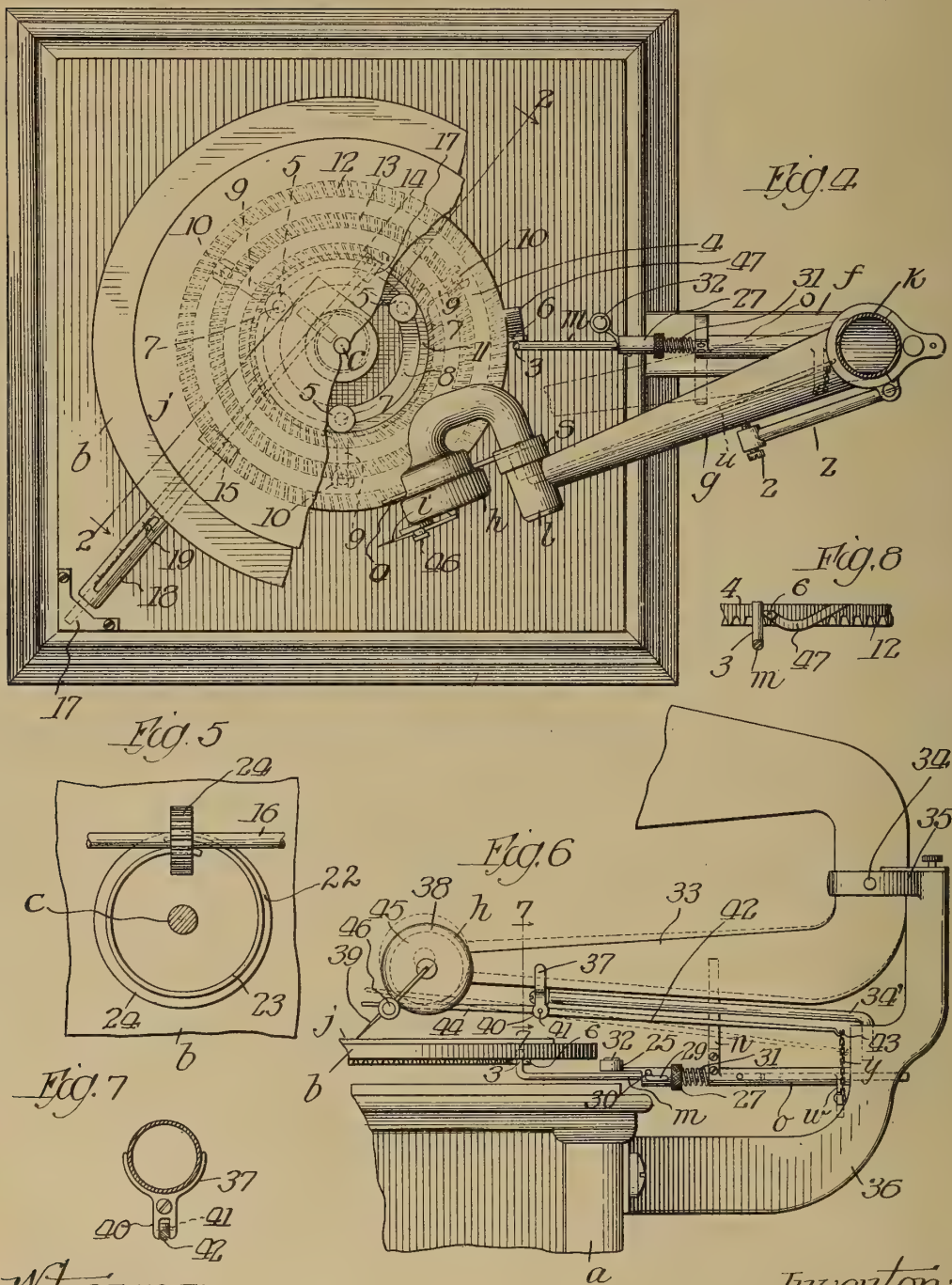


E. M. KELLOGG.  
 PHONOGRAPH.  
 APPLICATION FILED APR. 15, 1912.

1,130,173.

Patented Mar. 2, 1915.

2 SHEETS-SHEET 2.



Witnesses:  
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 Jennie L. Fiske

Inventor:  
 Edwin M. Kellogg  
 by Harry Irwin Cromer.  
 Attorney

# UNITED STATES PATENT OFFICE.

EDWIN M. KELLOGG, OF MOLINE, ILLINOIS.

## PHONOGRAPH.

1,130,173.

Specification of Letters Patent. *Patented Mar. 2, 1915.*

Application filed April 15, 1912. Serial No. 690,761.

*To all whom it may concern:*

Be it known that I, EDWIN M. KELLOGG, a citizen of the United States, residing in Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to that class of phonographs or machines for recording or reproducing sounds, having a stylus, needle or reproducer point adapted to engage a record, and provided with means for enabling a disk-shaped record to be repeatedly played, or the sounds produced by such a machine to be automatically repeated or reproduced.

The principal object of the invention is to provide a simple, economical and efficient phonograph or machine for recording or reproducing sounds, and a simple and efficient means for automatically lifting and moving the stylus, or recording needle in the direction of the starting point, so as to enable a record to be repeatedly played without requiring the attention of the operator or the return of the stylus to initial position by the operator, and more particularly to provide means whereby this may be accomplished in such a manner and by mechanism of such construction as to enable disk or flat records of unequal or varying lengths to be played successively and repeated in the proper time required for each record, or played but once as desired.

A further object is to produce means for automatically stopping the machine at the proper instant, upon the completion of the playing or reproduction of a record, or of each of a series of records, of unequal, varying, or equal lengths, as the case may be, and means for automatically raising the stylus out of engagement with the record at the proper instant, automatically returning the stylus or stylus and tone arm to proper starting position for records of varying or any desired length or dimensions, and lowering the stylus into the proper position to automatically begin at the beginning of a record of any desired length, all in such a manner as to avoid injury to the record or stylus or other parts of the machine.

Other and further objects of the invention will appear from an examination of the following description and claims, and of the drawings, which are made a part hereof.

The invention consists in the features,

combinations, and details of construction herein described and claimed.

In the accompanying drawings, Figure 1 is a view in side elevation of a machine of the type commonly known as the "Victor" provided with my invention and improvements; Fig. 2, a vertical sectional view of the upper portion of the same taken approximately on line 2 of Fig. 4, looking in the direction of the arrow; Fig. 3, an enlarged detail view in elevation of the pinion and adjustable sleeve shown in Fig. 2; Fig. 4, a plan view of the machine shown in Fig. 1, with a portion of the record and record-supporting turn-table broken away; Fig. 5, an enlarged detail plan view of the gear mechanism or pinion and scroll, (shown in Figs. 2 and 3) for operating the adjustable pinion shown in Figs. 2 and 3—the scroll being shown as it would appear when seen from the bottom; Fig. 6, a view in side elevation of a portion of a machine provided with my improvements and of which my invention forms a part, in which the tone arm is swung upward and downward on a pivotal support in raising and lowering the stylus, and in which the mechanism for raising and lowering the stylus and swinging the same to initial operative position serves to support both the tone arm and the stylus in raised position when the stylus is out of engagement with the record; Fig. 7, an enlarged detail sectional view taken on line 7 of Fig. 6, looking in the direction of the arrows; and Fig. 8, a detail view in elevation of the tripping and cam mechanism, for operating the rock shaft.

In constructing a phonograph or machine for recording and reproducing sounds and automatically repeating the playing or reproduction of records of varying or any desired length, in accordance with my invention and improvements, I provide a phonograph or sound recording and reproducing machine *a* having a record-supporting and operating mechanism comprising in its construction a rotary record-supporting member or turn table *b* operatively connected with a driving shaft or spindle *c* mounted in suitable bearings in the main stationary frame *d* of a phonograph of any desired ordinary or known form—the shaft *c* being connected with a suitable source of power, such as a spring-driven or electric motor *e*. The motor or driving mechanism for operating the shaft *c* may be of any ordinary



known or desired form, and it is therefore deemed unnecessary to illustrate the same in detail herein, as the construction of such motors is well understood by those skilled in the art.

The above elements may consist of parts of a phonograph or sound recording and reproducing instrument of any ordinary, known or desired type such, for instance, as that known as the "Victor" or that known as the "Columbia," or other form of phonograph, or sound recording and reproducing instrument or machine. Such a machine, complete and comprising said elements and all of the elements of an ordinary phonograph of any known or desired form is provided, as indicated in the drawings, and includes in its construction a bracket or tone-arm support *f* in which is pivotally mounted a tone-arm *g*, with the swinging or free end of which is connected a reproducer *h* having a stylus or reproducer point or needle *i* adapted to be moved into and out of engagement with a record of sound waves or phonographic record *j*, which record may be of any known or desired form of phonographic record, but which is here shown in the form of a disk record supported on the rotary support or turn table *b* and rotatable with and by the latter in the ordinary and well known manner.

The tone arm *g* is connected with a horn or other desired known or suitable form of resonant or vibratory body or element for phonographs or sound recording or reproducing instruments, said vibratory element being indicated by the reference letter *k*, and being the equivalent of a sounding-board or other resonant body.

In the form of machine shown in Figs. 1, 2, and 4 the stylus is adapted to be raised and lowered by swinging the reproducer upward and downward upon the pivotal center or axis *l* from the position shown in full lines to the position shown in broken lines in Fig. 1, and without raising or lowering the tone arm *g*, the stylus may be raised at the terminating point of the record and returned to initial position and lowered into operative position at the initial end of the record. In order to provide means for enabling this to be done automatically and repeated as many times as may be desired, and with records of any desired or varying lengths, and adapted to enable the rotation of the record to be automatically stopped, when desired, at the termination of a record, a rock shaft *m* having a lever arm *n* secured in fixed relation thereto by means of a sleeve or socket member *o* having a set screw or pin *p* for securing the sleeve *o* in fixed relation to the shaft, is rockingly mounted upon a suitable support which support may be in the form of a fixed stub shaft *q* having one end secured to the arm *f* by being inserted

in an opening in said arm in position to support the stub shaft *q* and the rock shaft *m*, and the sleeve *o* in operative position, as shown in Figs. 1 and 4. The stub shaft *q* is held rigidly in position by means of a set screw *r*; and the sleeve *o* is adapted to rotate or rock with the rock shaft *m* upon the stub shaft. The lever arm *n* extends upward and is in engagement with one side of the tone arm *g* in position to move the tone arm from the position indicated in broken lines in Fig. 4 to the position shown in full lines in said figure or from terminal position, with the stylus at the terminal of the record, to initial position, with the stylus at the initial end of the record.

A lever for raising and lowering the stylus is mounted in a suitable support which, in the type of machine shown in Figs. 1 and 4 consists of a supporting ring *s* having a perforated depending lug *t*. The lever *u* is pivotally mounted in this supporting ring which forms a fulcrum for the lever, and a relatively short arm of the lever *u* designated by the reference letter *v* extends beneath and in operative engagement with the reproducer and in position to raise and lower the latter and thereby the stylus when the opposite or relatively long arm of the lever *u* is swung downward by the rocking of the rock shaft *m* and the sleeve *o*, said sleeve *o* being connected with the end of the lever *u* which is nearest the pivotal center or axis of the tone arm or pivoted supporting member which forms a moving fulcrum for the stylus-lifting lever *u*, by means of a crank arm *w* on the sleeve *o* and a chain, cord or similar flexible connecting element *y* which is connected at its lower end with said crank arm and, at the other end, with the lever *u*. A stop arm *z*, mounted on the bracket *f* serves to limit the movement of the tone arm and stylus in one direction, and is provided with an adjustable screw 2 adapted to engage the tone arm and to be adjusted with accuracy.

The rock-shaft *m* is provided with an upwardly projecting finger or crank arm 3 and an annular disk or gear wheel 4 is mounted concentric with the shaft *c* upon grooved supporting rollers 5—see Figs. 2 and 4—and is provided with a peripheral projecting finger 6 movable into and out of operating engagement with the finger or crank arm 3 of the rock shaft *m*. This disk, 4, with its projecting finger is thus adapted to operate the rock shaft so as to cause the stylus to be raised and lowered and the stylus and tone arm to be returned, automatically, to initial position once for each revolution of the disk or gear wheel. The rollers or bearings 5 are journaled on upright bosses 7 which form an integral part or parts of an annular supporting casting 8 having laterally projecting arms 9 forked or perforated to



receive securing pins 10 which are mounted in the main frame of the machine and serve to hold the casting 8 and thereby the bearing rollers and the annular rotary disk or gear member 4 in operative position. The disk or gear member 4 is provided with an inner flange which extends into grooves or between flange portions of the bearing rollers, as shown in Figs. 2 and 4, and this flange is indicated by reference numeral 11.

On the under side of the gear member 4 and integral therewith rows of gear teeth 12, 13 and 14, are provided, each for a different size of phonographic record to be used—the outer row 12 being for use in connection with the longest records, the middle row for shorter records, and the inner row for those still shorter—and an adjustable pinion 15 is mounted upon a rotary shaft 16 journaled in suitable bearings 17 upon the main frame, said pinion being so connected with said shaft as to be movable longitudinally of the latter into engagement with the desired row of gear teeth of the gear member 4. The pinion is operatively connected with the shaft 16 so as to be rotatable with the latter, by means of a slotted sleeve or hub 18 in fixed relation to the pinion and encircling the shaft, and a pin 19 which projects laterally from the shaft and into the slot 20 of said sleeve. The sleeve is provided with indicator or gage marks 21 and the pin 19 is located in the proper position to indicate the relative position of the gear 15 to the rows of gear teeth on the gear member 4 by registering with the corresponding gage or index mark on the sleeve when the gear 15 is in toothed engagement with any row of gear teeth.

The disk or gear member 4 makes one complete revolution for each time the stylus travels over or is operated upon by a complete phonographic record, and during such complete revolution of the gear member 4 the record and turn table make as many revolutions as there are turns or laps in the complete record, and the shaft *c*, of course, revolves the turn table and record and makes the same number of revolutions that they make during each revolution of the gear member 4 with its finger 6 for operating the shaft *m*.

In order to obtain the desired relative movements of the various elements, a gear member,—preferably in the form of a spiral gear or flat worm 22 having a spiral tooth or scroll 23 on its flat or horizontal surface, and, by preference, on its under side, and in toothed engagement with a gear or worm wheel 24 which is fixed to the shaft 16—is fixed to the upright shaft or spindle *c*, as shown in Figs. 2, and 4.

In order to provide suitable means for stopping the machine automatically, when desired a brake 25, shown in Figs. 1, 4, and

6, is mounted on and rotatable with the rock shaft *m* by means of a sleeve 27, which forms part of the brake and encircles and is movable longitudinally of the shaft *m*, and an angular slot 29 in said sleeve has an elongated main portion lying longitudinally of the sleeve and a relatively short slot portion lying at an angle to such elongated main slot portion, and a pin 30 fixed to the shaft *m* extends into said slot. A compressible spring 31 encircles the rock shaft and has one end in engagement with the end of the sleeve portion of the brake and its other end in engagement with the sleeve *o* already described, and the brake is provided with a leather shoe or disk or turn-table engaging portion 32 which is held out of engagement with the turn table when the pin 30 is in the relatively short or transverse portion of the slot, as shown in Fig. 6. The brake 25 is obviously adapted to be rotated with respect to the rod *m* from the position shown in Fig. 6 into position to permit the pin 30 to extend into the main relatively long portion of the slot 29. The brake 25 with the slot 29 is thus permitted to be moved longitudinally of the rod *m* by the spring 31 from the position shown in Fig. 1 into position to extend beneath the edge of the turn table so as to come into contact with the latter when the shaft *m* is rotated or rocked by the finger 6 coming into contact with the finger 3 of the shaft *m*.

In operation, the shaft *c* is rotated by the motor, and turns with and causes the rotation of the turn table and the phonographic record thereon, and the scroll or spiral toothed gear member 22 fixed to the shaft *c* causes the gear 24, shaft 16 and gear 15 to rotate a distance corresponding with the rotation of the gear or pinion 24 one tooth for each complete revolution of the scroll 22 or the shaft *c* and record. The continued rotation of the shaft *c* and gear member or construction thus cause the disk 4 to make one complete revolution and operate the rock shaft *m* by causing the finger 6 to come into contact with the finger 3 on said shaft *m*, thereby causing the arm *w* on the sleeve *o* to operate the lever *u* and raise the stylus out of engagement with the record, and immediately following the initial upward movement of the stylus, causing the arm or lever *v* to contact the tone-arm or stylus-lifting lever support and move the tone arm and stylus to initial position so that the stylus will be permitted to descend sufficiently slowly to initial position in engagement with the record at the initial end thereof, as soon as the cam 47 moves over and out of engagement with the finger 3 so as to permit the arm *v* of the lever *u* to move downward with the stylus or reproducer. To permit the above described operation or movement of parts the brake should be in the position



shown in Figs. 1, 2 and 6. When the brake is released so as to be moved into operative position beneath the turn table by the spring 31, it is obvious that it will engage and stop the rotation of the turn table when the shaft *m* is rotated by the finger 6 of the gear member 4, as described.

Fig. 2 will serve as an illustration and is an illustration of the construction and arrangement of the elements of the machine shown in Fig. 6, or of the construction and arrangement of the elements shown in Fig. 2, as applied to the type of machine shown in Fig. 6. However, in the type of machine shown in Fig. 6, the tone-arm 33 is adapted to swing upward and downward on the axial center corresponding with the position of the trunnion or pivot 34 in the collar or socket member 35 of the bracket or arm 36 which corresponds with the bracket or arm *f* in Fig. 1. It is, therefore, not necessary to pivotally connect the reproducer with the tone-arm, as in the type of machine shown in Fig. 1, and a pivoted lever-supporting arm 34' is mounted with its pivotal center or axis in line with the axis of the tone arm 33, and in position to swing in a horizontal plane. The swinging end of the arm 34' is operatively connected with the tone arm 33 by means of a yoke or similar element 37 supported by the pivoted arm and forming an alining member between the tone arm and the pivoted arm 34' adapted to cause them to swing together when either is swung in a horizontal plane, but to permit the tone arm to be raised at its swinging end with respect to the arm 34' from the position shown in full lines to the position shown in broken lines in Fig. 6, to raise and lower the reproducer 38, and, thereby, the stylus 39. To provide for this, the upwardly projecting arms of the yoke 37 extend on opposite sides of and in engagement with the tone arm, as shown in Figs. 6 and 5. A depending portion 40 of the yoke 37, and a pivot pin 41 serve to pivotally connect a stylus-lifting lever 42 with the swinging end of the lever-supporting arm 34', so that the arm 34' with the yoke member and the pivot 41 form a fulcrum for the lever.

The arm of the lever 42 which is nearest the axis of the arm 34' and between the fulcrum and the pivoted end of said arm 34' is connected with the crank arm *w* on the sleeve or hollow shaft *o* which is connected with the rock-shaft *m* in the manner already described in connection with Figs. 1, 2, and 4. For this purpose a flexible element or chain *y* is secured at one end to the lever 42 by means of a hook 43, and at its opposite end, to the lever *w*. The opposite end of the lever 42 consists of a lever arm 44 which extends beneath and in position to engage and support the reproducer 38, to raise and

lower the stylus 39 in the manner suggested by the description of the elements shown in the other figures of the drawings. The tone-arm 33 and stylus 39 are thus provided with means for raising and lowering them, and for automatically swinging them from their positions when the terminal of a record is reached, back to initial position, in substantially the same manner already described in connection with the same or similar elements.

The functions of the elements shown in Fig. 6, and their mode of operation being obvious in view of the foregoing description of the mechanism in connection with the other figures of the drawings, further description is believed to be unnecessary, as the description of the parts shown in the other figures and not shown in Fig. 6 applies in all respects to the machine which is shown in Fig. 6, and which contains all of the elements shown in Figs. 2 and 5.

From the foregoing it will be seen that the sound box or reproducer *h*, the tone-arm, and the stylus-lifting lever, in the type of machine shown in Fig. 1 form pivotally mounted stylus-supporting mechanism, and are operatively connected with the stylus—the stylus being connected at its upper end with the diaphragm 45 of the reproducer or sound box *h*, and, at a point between the point of connection with the diaphragm and the record-engaging point of the stylus or needle, with the sound-box casing, by means of a connecting member or pivot 46 adapted to permit the vibration of the stylus and the communication of the vibrations to the diaphragm. In the type of machine shown in Fig. 6 the tone-arm 33, pivoted supporting arm 34', reproducer or sound-box *h*, and the stylus-lifting lever 42 form pivoted stylus-supporting mechanism, and in both forms of the machine the rock shaft *m* with its crank or tripping finger 3 and crank arm or upwardly projecting spring arm *n* forms rocking mechanism for moving the stylus-supporting mechanism from the position which it occupies at the limit of the movement of the parts in one direction, or with the stylus at the terminal of the record, back to initial position, or with the stylus in position to begin or repeat the playing of a record. The actuating gear member 4, with its tripping member 6 always moves the tripping finger 3 of the rock shaft or reciprocating member *m* the same distance. It is therefore necessary that some element between the drive-shaft and the pivoted stylus-supporting mechanism or tone arm, should be of flexible material or yieldingly mounted, in order that records of any desired length or varying lengths may be repeatedly played. The arm *n* is therefore, by preference, made in the form of a spring adapted to yield



when the tone-arm is in position to begin its movement with the stylus at the initial end of a relatively short record, thus permitting the rock shaft *m* to be rocked the required distance regardless of the position of the adjustable stop arm *z*, which stops the tone-arm and thereby the stylus, at the required position for beginning or repeating a record.

10 It is very desirable that means be provided whereby the stylus will be prevented from coming into contact with the revolving record until the latter has attained a speed which will enable the sounds to be  
15 properly produced, reproduced or repeated, and also to prevent the sudden or too rapid descent of the stylus into its lowered position or into contact with the record. In order to accomplish this, a projecting portion or shoe 47 is provided, which may be  
20 integral with the rotary actuating member 4 and tripping projection or finger 6. This shoe or guard is in position to follow the tripping or actuating finger 6 over the tripping finger 3 on the shaft *m*, and is provided with an upwardly and rearwardly inclined bottom surface adapted to engage the finger 3 so as to permit the latter to rise  
25 gradually to its normal upright or raised position, thereby permitting the gradual lowering of the arm *v* of the stylus-lifting lever *u*, and the gradual lowering of the sound-box or reproducer and stylus, by force of gravity, after the record-supporting member and record have been in rotation long enough to cause the shoe or guard 47 pass over and in contact with the tripping finger 3, as already suggested.

I claim:—

40 1. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus, a stylus-supporting mechanism pivotally mounted and operatively connected with the stylus, a vertical  
45 rotary driving shaft operatively connected with and in concentric relation to the rotary record-supporting turntable, rocking mechanism movable into and out of operative engagement with the stylus-supporting mechanism, for moving the stylus to initial position, rotary actuating mechanism located beneath and in concentric movable relation to the turntable and movable into and out of engagement with said rocking mechanism, and gear mechanism in engagement with said rotary actuating mechanism and operatively connected with the shaft.

2. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the turntable, stylus-supporting mechanism pivotally mounted and operatively connected with the stylus, a vertical driving shaft connected with the turntable, a rock shaft having a lever arm in operative en-

gagement with the stylus-supporting mechanism, a gear member on the driving shaft, and rotary actuating gear mechanism located beneath and in concentric movable relation to the turntable and operatively connected with the gear member on said driving shaft and movable into operative engagement with said rock shaft.

3. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the turntable, stylus-supporting mechanism pivotally mounted and operatively connected with the stylus, a rotary driving shaft operatively connected with the record-supporting turntable, rotary gear mechanism located beneath and in concentric relation to and rotatable with respect to the turntable and operatively connected with the driving shaft, a tripping member connected with and rotatable by means of said gear mechanism, and reversing mechanism comprising in its construction a rock shaft, a rocking lever member located in the path of movement of said rotary tripping member and connected with the rock shaft, and an arm connected with the rock shaft and movable into and out of engagement with the stylus-supporting mechanism, for returning the stylus-supporting mechanism and stylus to initial position.

4. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the turntable, stylus-supporting mechanism pivotally mounted and operatively connected with the stylus, a rotary driving shaft operatively connected with the record-supporting turntable, rotary gear mechanism located beneath and in concentric relation to and rotatable with respect to the turntable and operatively connected with the driving shaft, a tripping member connected with and rotatable by means of said gear mechanism, rocking mechanism comprising in its construction a rock shaft, a tripping lever arm connected with the rock shaft and located in the path of movement of said rotary tripping member, and a lever arm connected with the rock shaft and movable into engagement with the stylus-supporting mechanism, one of said lever arms being yielding and forming a yielding connection between the rock shaft and the element to be engaged by said lever arm.

5. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the turntable, a tone arm pivotally mounted and operatively connected with the stylus, a rotary driving shaft operatively connected with the record-supporting turntable, and tone-arm reversing mechanism comprising in its construction rotary gear mechanism located beneath and in concentric relation to



and rotatable with respect to the turn-table and operatively connected with the driving shaft, a rock shaft, a flexible lever arm connected with the rock shaft and movable into engagement with the tone arm, a tripping lever arm connected with the rock shaft, and a tripping member connected with and operated by said rotary gear mechanism and movable into and out of engagement with said tripping lever arm for rocking the rock shaft, to move the tone arm and stylus to initial position.

6. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the turntable, stylus-supporting mechanism pivotally mounted and operatively connected with the stylus, a rotary driving shaft connected with the record-supporting turntable, rotary gear mechanism located beneath and in concentric relation to and rotatable with respect to the turn-table and operatively connected with the driving shaft, a rock shaft, a lever arm connected with the rock shaft and movable into engagement with the stylus-supporting mechanism, a tripping lever arm on the rock shaft, a tripping finger connected with and operated by said rotary gear mechanism and movable into engagement with the tripping lever arm on the rock shaft, and a cam member extending backward from the tripping finger and movable with the latter, and having an upwardly and rearwardly inclined bottom surface portion movable into engagement with the tripping lever arm located on the rock shaft.

7. In a machine of the class described, the combination of a rotary record-supporting member, a stylus, stylus supporting mechanism pivotally mounted and operatively connected with the stylus, a rotary driving shaft connected with the rotary record-supporting member, operating mechanism in operative engagement with the stylus supporting mechanism for moving the latter and the stylus to initial position, a rotary gear member located beneath and in concentric relation to and rotatable with respect to the turn-table and in movable relation to the driving shaft, an actuating finger on said gear member and movable into and out of engagement with said operating mechanism, a gear on the driving shaft, a counter-shaft, a gear wheel on the counter shaft and in toothed engagement with the gear located on the driving shaft, and a gear member on the counter-shaft and in toothed engagement with the gear member on which the said actuating finger is located.

8. In a machine of the class described, the combination of a rotary record-supporting member, a stylus, stylus supporting mechanism pivotally mounted and operatively connected with the stylus, a rotary driving

shaft connected with the rotary record-supporting member, rocking mechanism in operative engagement with the stylus-supporting mechanism, for moving the latter and the stylus to initial position, a rotary gear member comprising in its construction a plurality of rows of gear teeth, a tripping member on said gear member and movable into and out of engagement with the rocking mechanism, a gear member on the driving shaft, a counter-shaft, a gear member on the counter shaft and in toothed engagement with the gear member located on the driving shaft, and a gear member connected with such counter-shaft and movable into toothed engagement with any desired row of gear teeth on the first mentioned gear member.

9. In a machine of the class described, the combination of a rotary record-supporting member, a stylus, stylus-supporting mechanism pivotally mounted and operatively connected with the stylus, a rotary driving shaft connected with the rotary record-supporting member, rocking mechanism operatively connected with the stylus-supporting mechanism, for moving the stylus to initial position, a rotary actuating member located beneath and in concentric relation to and rotatable with respect to the turn-table and movable into and out of engagement with the rocking mechanism, and means for changing the speed of rotation of said rotary actuating member with respect to the driving shaft and rotary record-supporting member.

10. In a machine of the class described, the combination of a rotary record-supporting member, a stylus, stylus-supporting mechanism pivotally mounted and operatively connected with the stylus, a rotary driving shaft connected with the rotary record-supporting member, a rock-shaft, means for operatively connecting the rock-shaft with the stylus-supporting mechanism, a tripping finger on the rock-shaft, a rotary actuating member located beneath and in concentric relation to and rotatable with respect to the turn-table and in movable relation to the driving shaft, an actuating finger on the rotary actuating member and movable into and out of engagement with the tripping finger on the rock-shaft, a gear member on the driving shaft, and means for operatively connecting said rotary actuating member with the gear member located on the driving shaft.

11. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the record-supporting turntable, a stylus lifting lever, a lever-supporting member pivotally mounted in a stationary support in supporting engagement with the stylus lifting lever, a rock shaft, means for opera-

tively connecting the rock shaft with the pivoted lever-supporting member, means for connecting the rock shaft with the stylus lifting lever, and a rotary actuating gear member located beneath and in concentric relation to and rotatable with respect to the turn-table, for operating the rock shaft and thereby the stylus lifting lever and pivoted lever-supporting member.

10 12. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the record-supporting turntable, a stylus lifting lever, a lever supporting member 15 pivotally mounted in a stationary support and in supporting engagement with the stylus lifting lever, a sound box connected with the stylus and movable with the pivoted lever supporting member, a rock shaft, 20 a flexible lever arm connected with the rock shaft and movable into engagement with the pivoted lever-supporting member, means for connecting the rock shaft with the stylus lifting lever, and means for operating the 25 rock shaft.

13. In a machine of the class described, the combination of a rotary record-supporting turntable, a stylus movable transversely of the turntable, a sound box operatively 30 connected with the stylus, a tone arm pivotally mounted and connected with the sound box, a rock shaft journaled in a suitable support, means for operatively connecting the rock shaft with the tone arm, and 35 a brake slidably mounted upon and rotatable with the rock shaft, and movable into

and out of engagement with the record-supporting turntable.

14. In a machine of the class described, the combination of a rotary record supporting turntable, a stylus movable transversely 40 of the turntable, a sound box operatively connected with the stylus, a tone arm pivotally mounted and connected with the sound box, a rock shaft journaled in a suitable 45 support, means for operatively connecting the rock shaft with the tone arm, a brake comprising in its construction a slotted sleeve mounted upon and movable longitudinally of the rock shaft, and a brake 50 shoe connected with the sleeve and movable into engagement with the turntable, a pin mounted on the rock shaft and extending into the slotted portion of such sleeve, and 55 a spring in yielding engagement with the sleeve.

15. In a machine of the class described, the combination of a rotary record-supporting turntable, a sound box, a stylus connected with the sound box, a tone arm pivotally mounted and connected with the 60 sound box, a rock shaft journaled in a stationary support, a flexible arm connected with the rock shaft and movable into engagement with the tone arm, a brake mounted upon and movable longitudinally of the 65 rock shaft, and means for rocking the shaft.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





SPEAKER CONNECTION FOR TALKING MACHINES.  
# 1,130,298 - F. C. Kent & C. W. Lindholm,  
Patented-March 2, 1915.  
Filed-May 27, 1914.

F. C. KENT & C. W. LINDHOLM.  
SPEAKER CONNECTION FOR TALKING MACHINES.  
APPLICATION FILED MAY 27, 1914.

1,130,298.

Patented Mar. 2, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

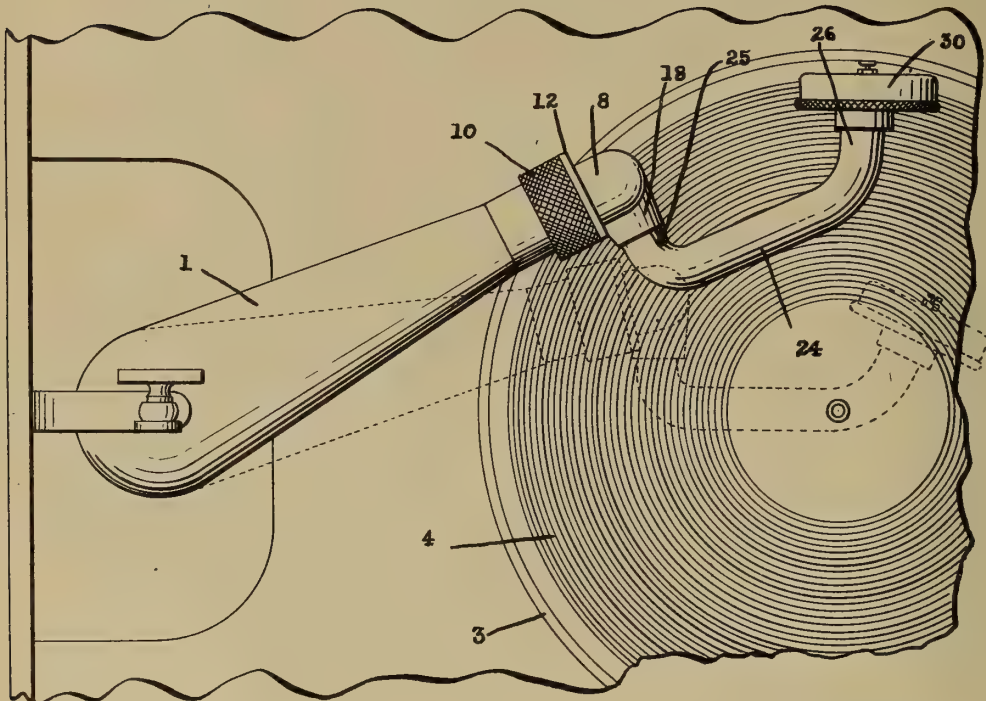


Fig. 3.

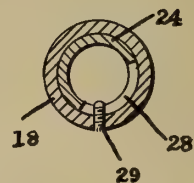
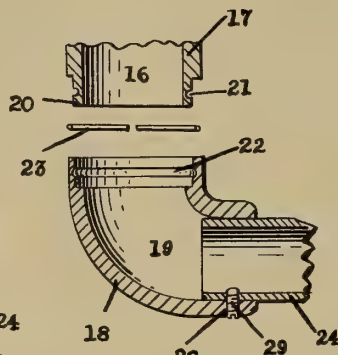
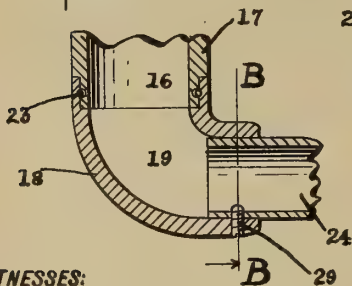


Fig. 5.

Fig. 4.

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2 SHEETS—SHEET 2.

Fig. 2.

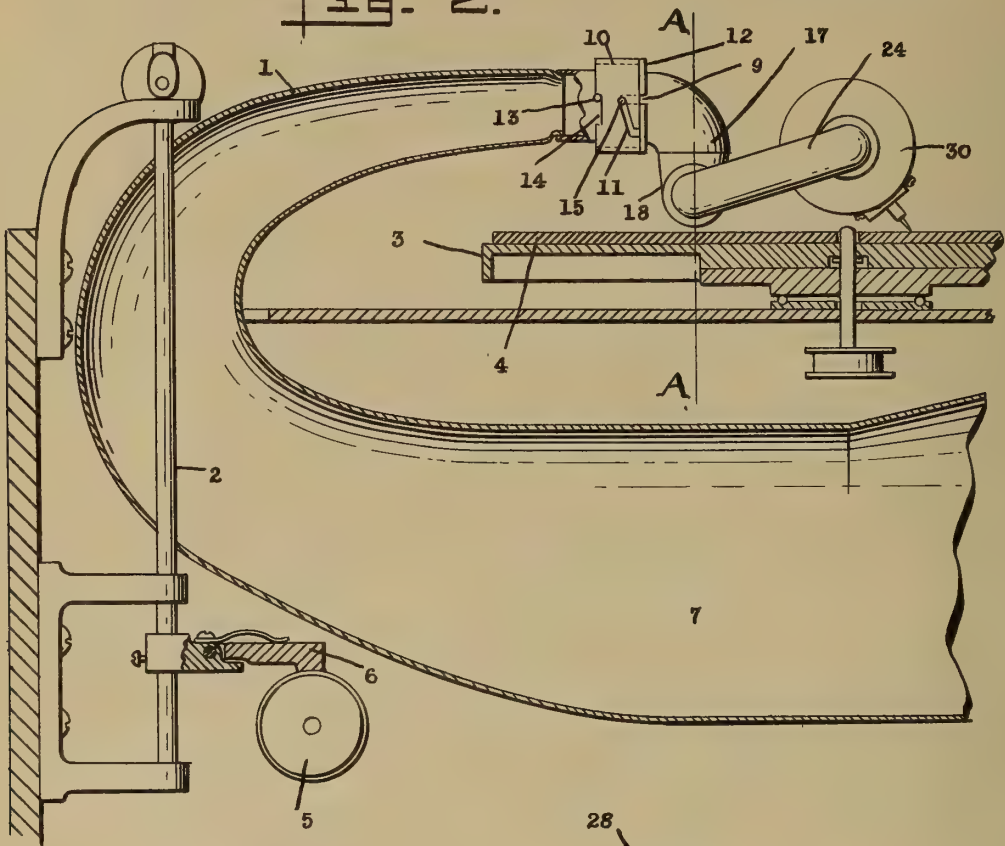


Fig. 6.

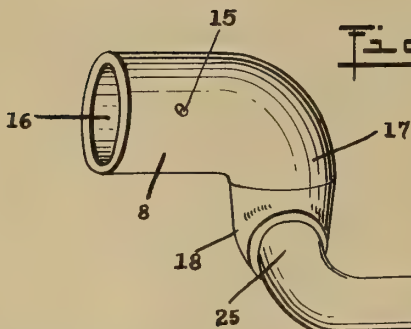
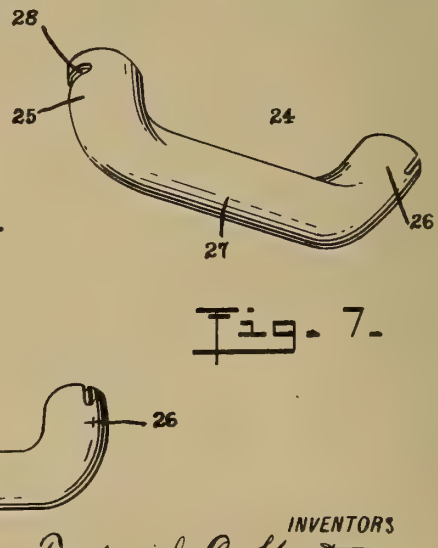


Fig. 7.



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# UNITED STATES PATENT OFFICE.

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SPEAKER CONNECTION FOR TALKING-MACHINES.

1,130,298.

Specification of Letters Patent.

Patented Mar. 2, 1915.

Application filed May 27, 1914. Serial No. 841,190.

*To all whom it may concern:*

Be it known that we, FREDERICK C. KENT and CARL WILLIAM LINDHOLM, both citizens of the United States, and residents of Newark, in the county of Essex and State of New Jersey, have invented certain Improvements in Speaker Connections for Talking-Machines, of which the following is a specification.

Of the various talking machines now on the market there are two popular makes, one of which employs record disks from which sound waves are produced by the bearing of a needle on the side wall of a spiral groove in the record disk, while the other produces sound waves by a stylus bearing upon the bottom of the groove. Obviously, record disks manufactured to be played upon one make of machine will not play upon the other, and vice versa.

The present invention relates, therefore, more particularly to means for adapting a machine which normally plays records by the stylus bearing on the bottom of the record groove, to play records in which a needle bears on the side wall of the groove, and the objects of the invention are to provide an efficient device of this character; to enable the device to be readily applied to or removed from the machine; to allow for vertical and lateral displacement; to secure simplicity of construction and operation, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several views, Figure 1 is a plan of a portion of a talking machine normally adapted to employ a stylus bearing on the bottom of the record groove, with our invention applied to enable its stylus to bear upon the side of a record groove; Fig. 2 is a vertical sectional view longitudinally through the tone arm thereof; Fig. 3 is a section on line A—A of Fig. 2; Fig. 4 is a similar sectional view showing the parts separated; Fig. 5 is a sectional view on line B—B of Fig. 3; Fig. 6 is a perspective view of our device detached from the machine, and Fig. 7 is a perspective view of the reproducer mounting.

In the specific embodiment of the invention illustrated in said drawings, the reference numeral 1 indicates a tone-arm secured upon an upright pivot rod 2 and adapted to swing horizontally over a revolving table

3 and record 4 thereon, in substantially parallel relation thereto. The particular machine here shown includes an axially horizontal worm wheel 5 adjacent the lower end of the pivot rod adapted to rotate in synchronism with the table. A radial arm 6 secured to the pivot rod 2 projects over the worm wheel 5 and is threaded at its end to mesh therewith. With the worm wheel rotating, it will be obvious that the tone-arm will be swung gradually across the table. The pivoted end of the tone-arm connects with an amplifying horn 7, being shown integral therewith.

Our device is adapted to be applied to the end of the tone-arm which overlies the record and for this purpose provides a neck 8 adapted to be inserted in the tubular end of the tone-arm in the same way that the neck of a reproducer with a stylus adapted to engage the bottom of the record groove is inserted. For holding said neck in place, the tone-arm is slotted inwardly from its end as at 9, and around this slotted end is a collar 10 having a bayonet-joint slot 11 opening toward the free end of the tone-arm. This collar is prevented from longitudinal movement by any suitable means, such as the flange 12 on the end of the tone-arm and the pin 13 at the opposite side of the collar, and has a rotary movement limited by said pin 13 engaging the ends of a recess 14 in the edge of the collar sufficient to admit of registration of the opening of the bayonet-joint slot 11 and the slot 9 in the tone-arm and yet allow the collar to be turned so that the inner end of the bayonet-joint slot 11 will register with the inner end of the slot 9 in the tone-arm. A radially projecting pin 15 on the neck 8 admits of the neck being inserted in the tone-arm when said pin enters the registering slots, and then as the collar 10 is turned the pin enters farther into the straight slot 9 of the tone-arm and to the inner end of the bayonet-joint slot 11. In this manner the neck 8 is prevented from either turning or sliding out, and yet can be readily and quickly released by turning the collar 10 back to bring the open ends of the slots 9, 11 into registration.

It is to be understood that the neck 8 is hollow, providing an interior passage 16 for transmitting the sound waves. The end of the neck away from the tone-arm preferably turns downward at substantially right angles, as at 17, and has its extremity in a



plane substantially parallel to the table and record, above the same. An elbow 18 is rotatably carried at this end of the neck 8 with its interior passage 19 in continuation of the interior passage 16 of the neck. In order to pivotally mount the elbow 18 on the neck 8, we have shown the neck reduced in diameter adjacent its end and the reduced portion 20 inserted in the upper end of the elbow, (see Figs. 3 and 4). A peripheral groove 21 is cut in the outer surface of the reduced portion 20 and a corresponding groove 22 is cut around the interior surface of the elbow to register with the groove 21 of the neck. Furthermore, said groove 21 in the neck is cut deeper than the groove 22 in the elbow, so that in assembling the parts a round wire expansion spring 23 may be pressed into the groove 21 of the neck until the grooves register, when the spring will spread and part of it will lie in the groove 22 of the elbow and part will lie in the groove 21 of the neck. Obviously, the elbow will then be free to revolve with respect to the neck and yet they will be connected against any separation likely to occur in ordinary usage.

Projecting from the end of the elbow which is substantially horizontal in use is the reproducer tube 24 which preferably comprises a tube having end portions 25, 26 bent substantially parallel and in the same direction but separated by a middle portion 27, which we have shown straight although it might be otherwise, (see Fig. 7). The end portion 25, which enters the elbow, has a slot 28 extending circumferentially part of the way around itself and a screw 29 projects into this slot from the elbow, thus allowing a limited turning of the reproducer in the elbow, but holding said tube and elbow from separating, (see Fig. 5). The opposite end portion 26 carries the usual sound reproducer 30 which has a needle to engage the side of the spiral groove in the record.

It will be understood that whereas the phonograph shown is usually employed with a reproducer applied directly to the end of the tone-arm and having a stylus adapted to engage the bottom of a record groove, if it is desired to play a record of the other kind our improved device is applied to the tone-arm carrying a reproducer with a stylus adapted to engage the side wall of the groove, all as shown in the drawings. When this is done the rotatable connection between the neck 8 and elbow 18 which permits swinging upon a vertical axis enables the tone-arm to move slower than the reproducer, as is necessary when a record of the other kind is played upon a machine of the type shown, and furthermore the swivel

connection between the reproducer tube 24 and the elbow 18 permits vertical movement of the reproducer.

Obviously detail modifications may be made in manufacturing our improved speaker connection for talking machines without departing from the spirit and scope of the invention, and we do not wish to be understood as limiting ourselves except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what we claim is—

1. A speaker connection for talking machines comprising in combination a tubular neck-piece having one end adapted to receive the tone-arm of a talking machine and the other end directed downward, a tubular elbow telescopically receiving said downward end of the neck-piece, the overlapping portions of said elbow and neck-piece having opposite grooves, a spring ring in said grooves, preventing separation of the parts while permitting relative rotation, and a reproducer tube rotatably connected to the other end of said elbow to swing in an upright plane.

2. In combination with a talking machine having a revolving table and a tone arm open longitudinally at one end, of a neck having a portion adapted to receive said open end of the tone arm longitudinally and another portion turning downward adjacent said end of the tone arm, an elbow supported at the lower end of said neck free to turn with respect thereto in a plane parallel to said table and having its lower end opening laterally of the tone arm, a reproducer tube in the laterally opening end of said elbow free to be turned therein, and a reproducer at the outer end of said reproducer tube.

3. In combination with a talking machine having a revolving table and a tone arm open longitudinally at one end, of a neck having a portion adapted to receive said open end of the tone arm longitudinally and another portion turning downward adjacent said end of the tone arm, an elbow supported at the lower end of said neck free to turn with respect thereto in a plane parallel to said table and having its lower end opening laterally of the tone arm, a reproducer tube in the laterally opening end of said elbow free to be turned therein, a reproducer at the outer end of said reproducer tube, and means for retaining said neck connected to said tone arm and preventing rotation thereof.

FREDERICK C. KENT.

CARL WILLIAM LINDHOLM.

Witnesses:

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GRAPHOPHONE.,

# 1,130,837-A. E. Parnall,

Patented-March 9, 1915.

Filed-March 15, 1913.

A. E. PARNALL.  
GRAPHOPHONE.

APPLICATION FILED MAR. 15, 1913.

1,130,837.

Patented Mar. 9, 1915.

3 SHEETS-SHEET 1.

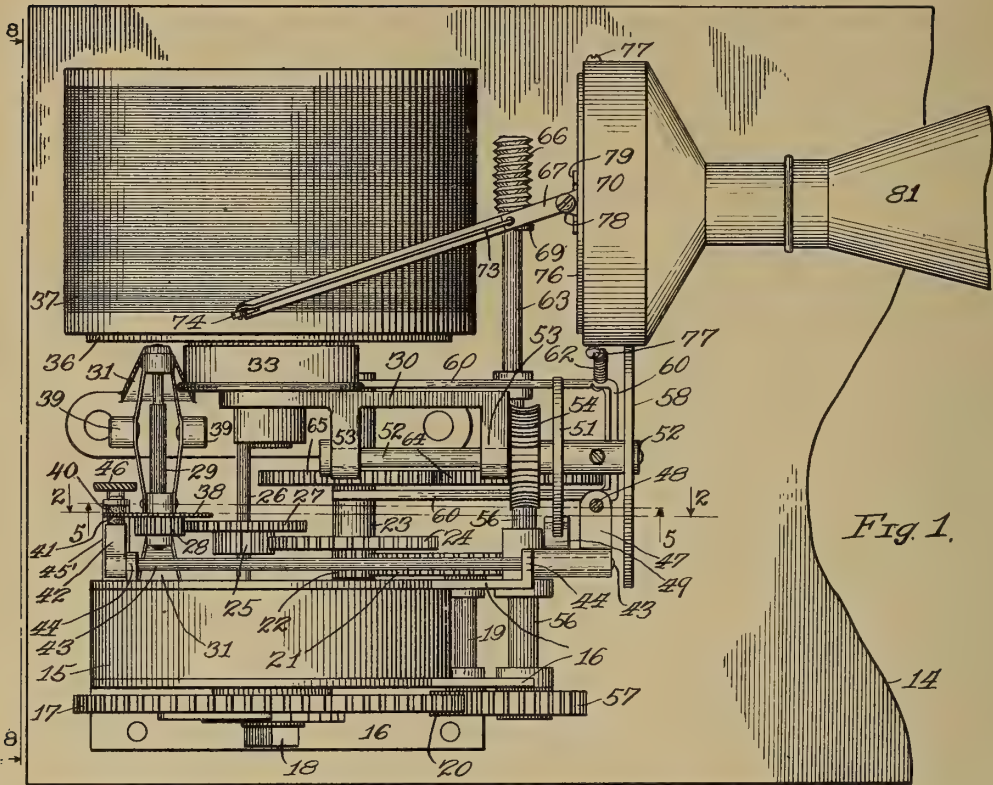
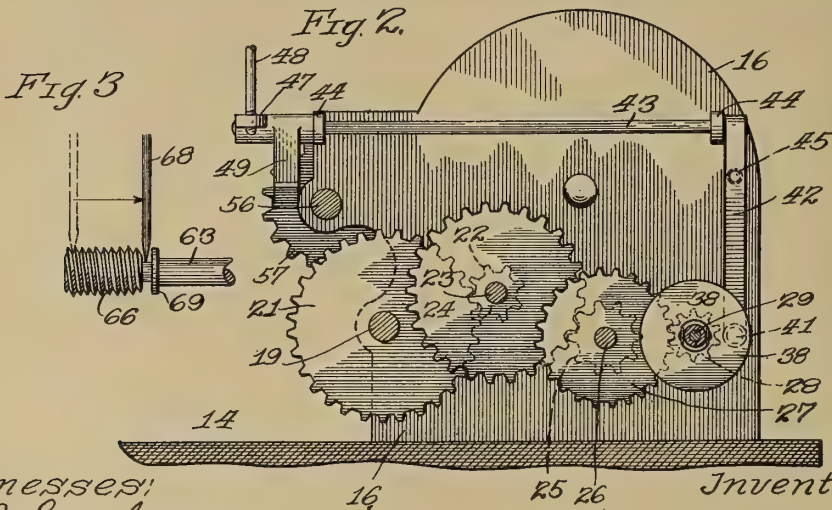


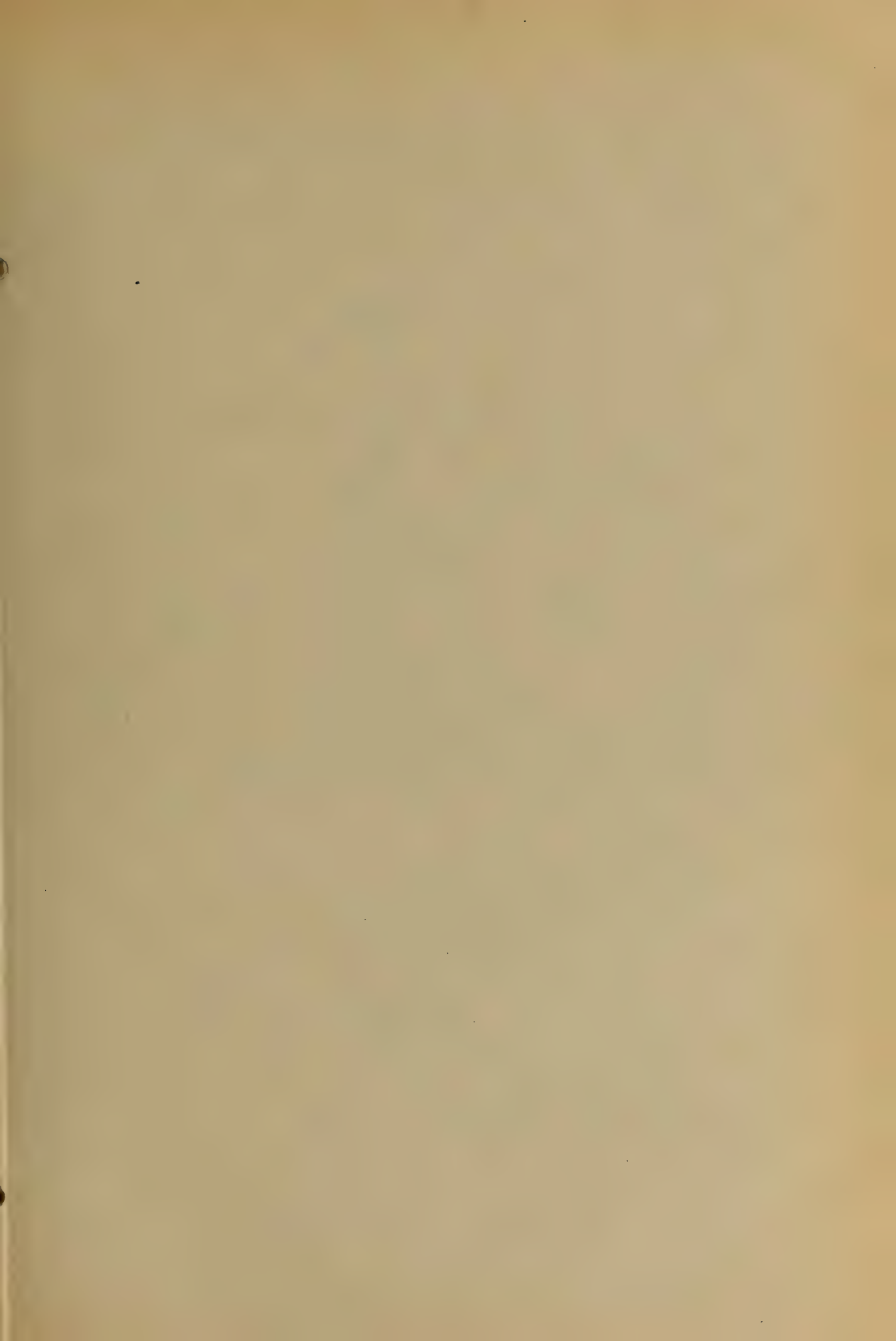
Fig. 1.



Witnesses:  
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R. P. Farnington

Inventor:  
A. E. Parnall  
By J. McRoberts  
His Atty.





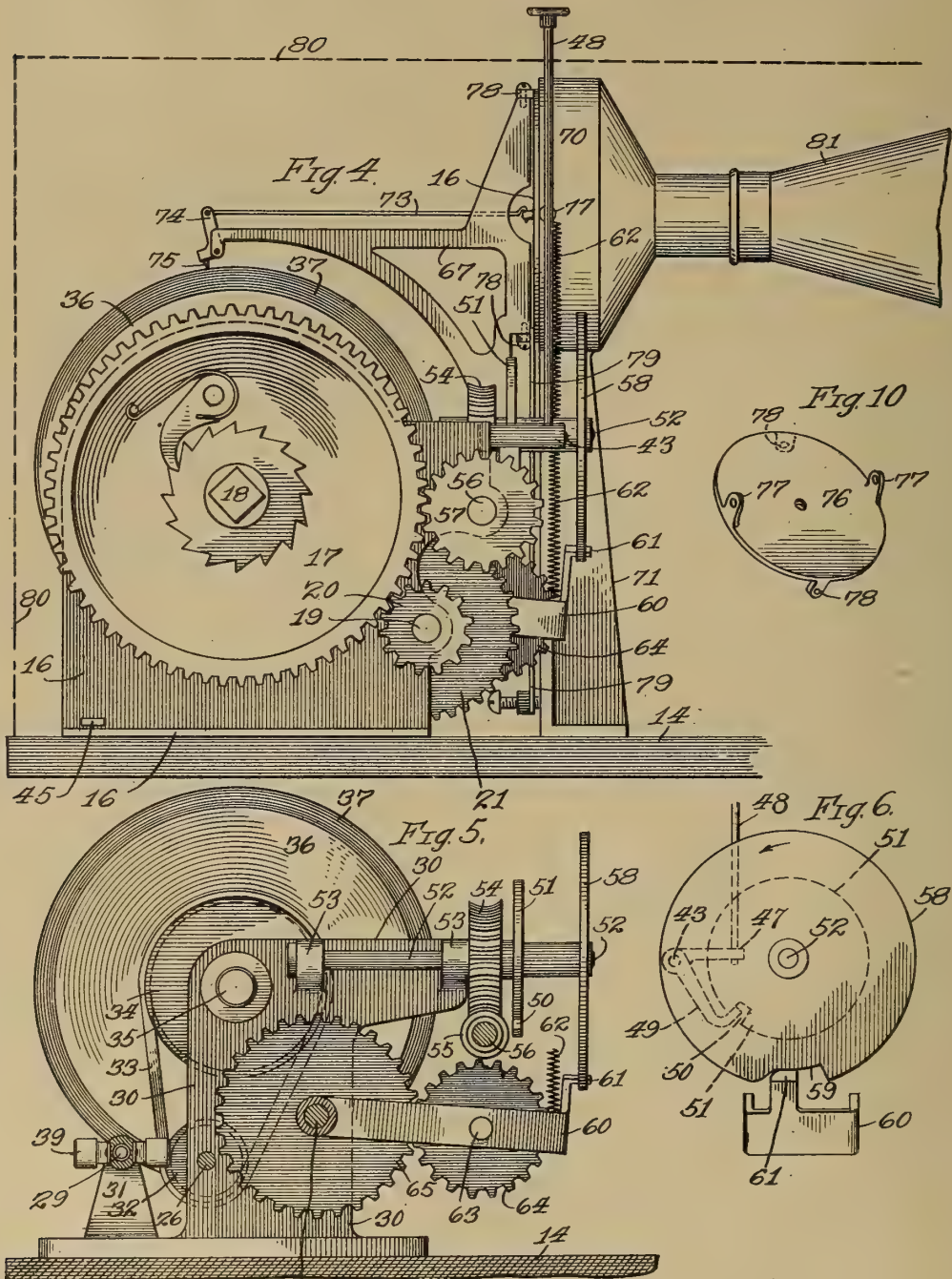
A. E. PARNALL.  
GRAPHOPHONE.

APPLICATION FILED MAR. 15, 1913.

1,130,837.

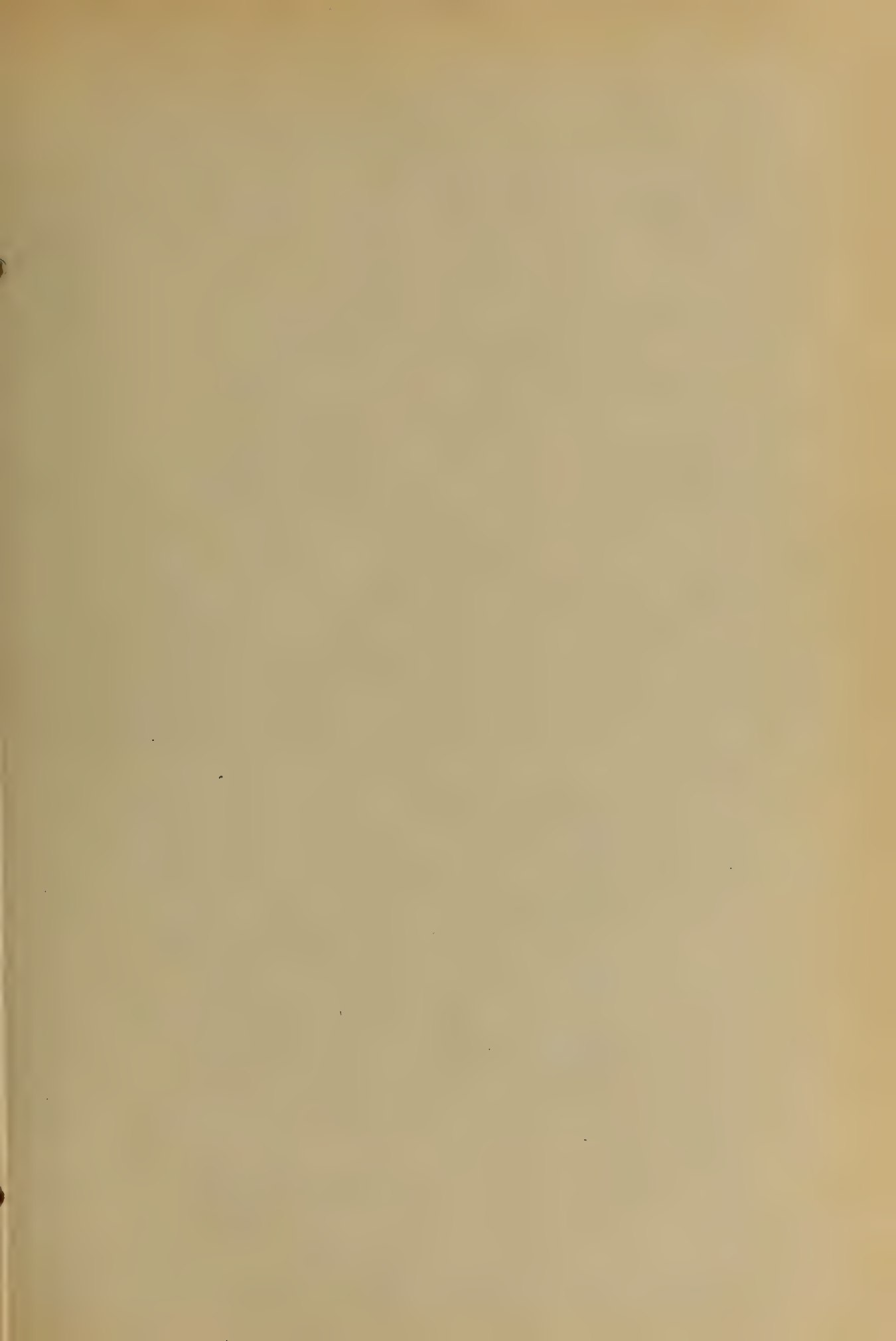
Patented Mar. 9, 1915.

3 SHEETS—SHEET 2.



Witnesses:  
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R. J. Fanning

Inventor:  
A. E. Parnall  
By *J. M. Roberts*  
his Att'y





A. E. PARNALL.

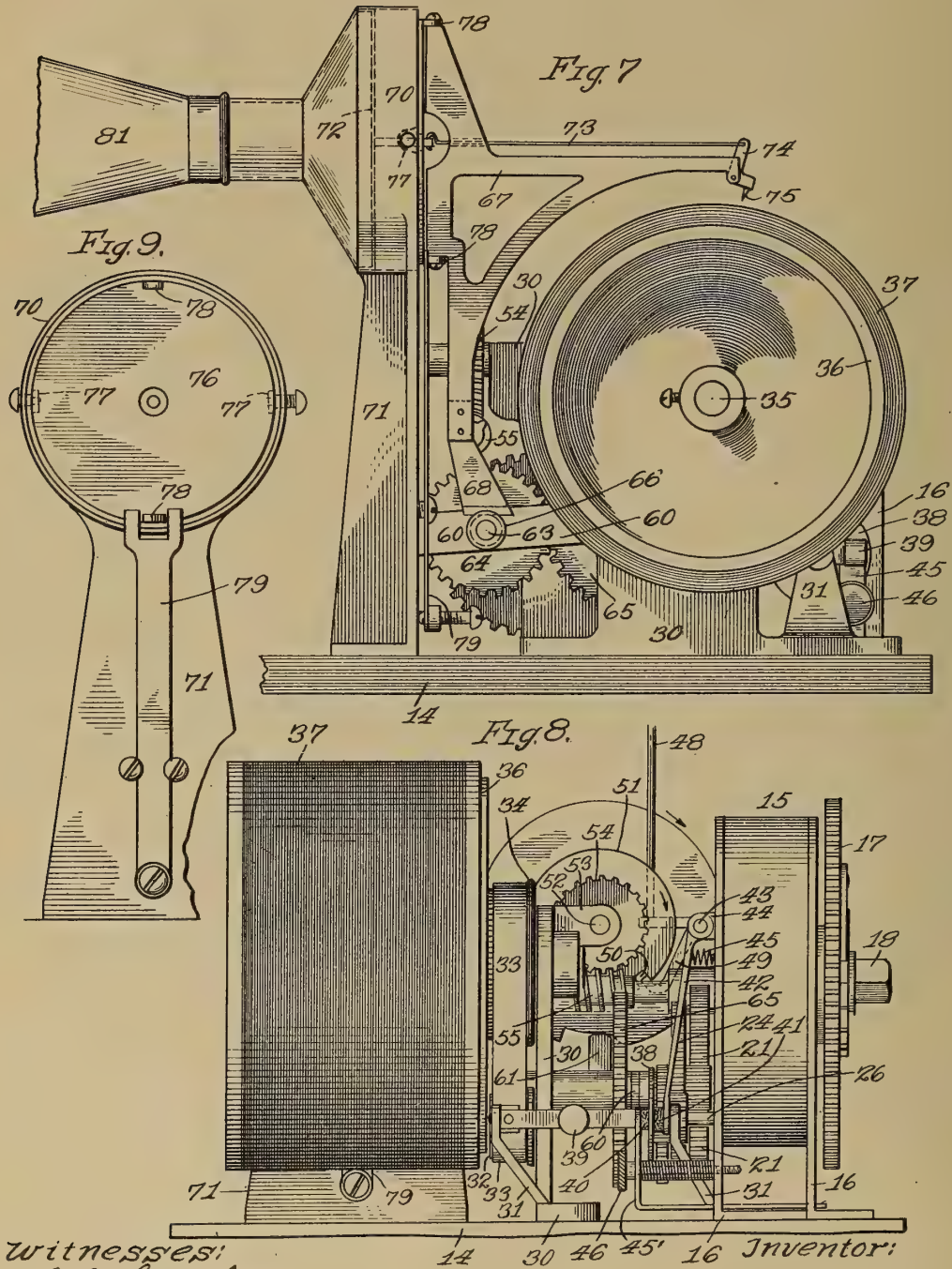
GRAPHOPHONE.

APPLICATION FILED MAR. 15, 1913.

Patented Mar. 9, 1915.

3 SHEETS-SHEET 3.

1,130,837.



Witnesses:  
L. B. Graham  
J. E. Parnall

Inventor:  
A. E. Parnall  
By J. M. Roberts  
his Att'y.

# UNITED STATES PATENT OFFICE.

ARCHIE E. PARNALL, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO  
FRANK W. WILLIAMS, OF CHICAGO, ILLINOIS.

## GRAPHOPHONE.

1,130,837.

Specification of Letters Patent.

Patented Mar. 9, 1915.

Application filed March 15, 1913. Serial No. 754,444.

*To all whom it may concern:*

Be it known that I, ARCHIE E. PARNALL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Graphophones, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to graphophones and consists in the matters hereinafter described and then pointed out in the appended claims.

In the accompanying drawings illustrating a practical embodiment of the several features of my invention—Figure 1 is a plan view of the machine; Fig. 2 is a sectional view on the line 2—2 of Fig. 1 looking in the direction of its arrows; Fig. 3 is a detail view of the returning-worm and the needle-arm; Fig. 4 is a view in side elevation taken at the motor side of the machine; Fig. 5 is a sectional view on the line 5—5 of Fig. 1 looking in the direction of its arrows; Fig. 6 is a front view of parts of Fig. 5 taken at the right hand; Fig. 7 is a view in side elevation on the side opposite to Fig. 4 and with the parts in position for returning the needle-arm to its initial position on the record; Fig. 8 is a view in rear elevation taken at the left hand of Fig. 1; Fig. 9 is a view in rear elevation of parts of the sound-box, and Fig. 10 is a detail view showing the means for providing a universal joint for the needle-arm on the box.

The several parts are mounted upon a suitable base 14 and power is provided for operating the parts by a suitable motor which in the present embodiment is in the form of a spring-barrel 15 mounted in the frame 16 and by which rotation is given to the spur wheel 17 which forms the main drive wheel. The spring-barrel and its parts are of the usual construction and operation, the spring (not shown) being wound up in the usual way by applying a suitable key (not shown) to the squared end 18 of its shaft and communicating motion to the wheel 17. A short shaft 19 suitably journaled in the uprights 16 carries at one end a small pinion 20 (Fig. 4) meshing with the drive wheel 17 and at its other end a large pinion 21 (Figs. 1 and 2) driving a small pinion 22 on a shaft 23 which in turn carries a large pinion 24 driving a small pinion 25 on a second shaft 26 which in its turn

carries a large pinion 27 driving a small pinion 28 on a third shaft 29, the shafts 23 and 26 being suitably mounted in the uprights 16 and 30 and the shaft 29 in the brackets 31. The shaft 26 has a pulley 32 communicating motion by belt 33 to a pulley 34 on the shaft 35 mounted in the upright 30 and actuating the record carrier or mandrel 36 upon which records 37 of ordinary cylindrical type are removably mounted.

When the spring of the barrel 15 is wound up it acts to revolve the wheel 17 and the connected train of gears, and in order to control the rotation of the drive wheel I provide a brake-pad to stop the machine and a speed-regulating pad to regulate the speed of the machine, both pads operating on the flange 38 of the usual speed governor 39. The disk 38 revolves between a stationary friction pad 40 and a movable friction pad 41 carried by the free end of the swinging arm 42 mounted on a rock-shaft 43 journaled in bearings 44 on the frame, the pad 41 being pressed against the disk 38 by an expansion spring 45 reacting between the arm 42 and the frame. The speed of the governor and of the train of gears may be regulated by adjusting the pad 40 toward or away from the disk 38 by mounting it in an adjustable frame 45' guided in bearings in the framework 16 and set in any desired position by a set screw 46. The movable friction pad 41 under the force of its spring acts as a brake to stop the machine when the rock-shaft is allowed to turn in proper direction for the pad to engage the disk by the latch and trip-disk now about to be described.

The rock shaft 43 is provided with a lateral arm 47 engaged by the starting-key 48 which may extend up through any suitable casing in which the machine may be inclosed, such as shown in dotted lines 80 in Fig. 4. The rock-shaft 43 is also provided with a latch 49 actuated by spring 45 to engage a gate or slot 50 in a stop-disk 51 which trips the brake-pad 41 and is mounted near the forward end of a counter shaft 52 rotatably mounted in bearings 53 on the upright 30 and carrying a worm-wheel 54 driven by a worm-gear 55 on the shaft 56 journaled in bearings in the frame and provided with a pinion 57 meshing with the drive-wheel 17. When the brake-pad 41 is



withdrawn from engagement with the disk 38 by rocking the shaft 43, the shaft 52 is free to make a revolution under the action of the spring-barrel, the periphery of the disk 51 holding the latch 49 down and so the pad 41 out of contact with the brake flange or disk 38, and when the latch again enters its slot or gate when the shaft has completed a revolution it trips the rock-shaft which then is free to turn under the force of the spring 45 to engage the pad 41 with the governor-flange or disk to automatically stop the machine. The gate in the stop-disk 51 is so related to the record that it allows the brake to stop the action of the machine when the needle completes its movement over the record and is returned to its initial position.

The rock-shaft 43, its arm 47 and latch 49 constitute a rock-frame by which the operation of the machine is controlled, its starting being effected by the spring-motor when this frame is moved to place its spring 45 under compression and its movement being stopped by the brake-pad 41 acting on the flange 38 when the latch enters the gate 50 of the trip-disk 51 which acts as a timing-disk to trip the brake when the stylus or needle has traveled a predetermined distance over the record.

I provide means for automatically returning the needle to its starting point and in the form shown this function is controlled by a disk or wheel 58 mounted on the front end of the shaft 52 and provided with one or more peripheral recesses or notches 59. A frame 60 is yieldingly hung at its rear end upon the shaft 23 and carries at its forward end a lug or projection 61 in the path of the disk 58 and held against it by the retractile spring 62 secured thereto and to the frame-work. The swinging frame carries a cross-shaft 63 provided with a pinion 64 meshing with a pinion 65 on the shaft 23 so that the former is rotated in any position of the frame. The shaft 63 is extended beyond the frame along side the record-carrier as shown in Fig. 1 and is provided with a reversing worm 66 below the needle-arm 67 which is provided with a downwardly projecting leg 68 adapted to run in the worm when the frame 60 is swung to its upward position by the spring 62. When the projection 61 rests in the notch 59 and the latch 49 is in its gate 50 in the position shown in Fig. 6, the brake-pad 41 holds the parts against movement with the needle-arm in the position shown in Fig. 1 so that the needle or stylus coöperates with the record, and when the key 47 presses the latch out of its gate and releases the brake the record rotates and the pinion 64 and the disks 51 and 58 revolve, the latter in the direction of the arrow in Fig. 6. The initial movement of the disk 58 causes the beveled or inclined end of its recess 59 to cam the

frame 60 downwardly and so swing the worm 66 out of the path of the leg 68 of the needle-arm and the latter is free to travel across the record. When the disk 58 has nearly completed a revolution the lug 61 is forced by spring 62 into the abrupt end of the recess or notch 59 and the frame 60 rises so that the worm 66 engages with the leg 68. The depth of the notch and the relation of the parts is such that the upward motion of the frame and worm is sufficient to raise the needle-arm so that the needle is lifted from contact with the record as shown in Fig. 7, and the arm being mounted so as to swing freely back and forth, preferably by means hereinafter described, the rotation of the reversely threaded worm driven by its drive pinions 64 and 65 returns the needle-arm to its initial position to engage the beginning of the record as in Fig. 1. The worm is of sufficient length to engage the leg at any point of its travel and return it to engage the first line of the record, and the edge of the notch 59 between its ends is concentric with the periphery of the disk to provide a dead space or dwell as shown in Fig. 6 so that the frame will be held elevated long enough to allow the worm to return the arm to its initial position where it is stopped by the flange 69 on the shaft 63 engaging the leg 68, the lug 61 then reaching its original position shown in Fig. 6. The notch 59 and gate 50 are so arranged and related with the entrance end of the former in advance of the latter that the latch 49 drops into the latter when the lug 61 reaches the end of its dwell in the notch as shown in Fig. 6, thereby tripping the brake-pad for automatically stopping the machine.

The needle or stylus may be picked up and returned to its initial position at any point of its travel on the record, and the disk 58 may be provided with a plurality of recesses or notches to enable the needle-returning mechanism to act so that the record may be repeated during the revolution of the disk. For example, with a record of given width, said one inch, the disk 58 may be of sufficient size so that the travel of the needle or stylus across the record will be coincident with the travel of the peripheral portion of the disk over the lug 61 in order that when the needle has reached the end of the record the lug will enter the notch and the needle will be automatically returned to place as above described; or with a record of less width, say one-half inch, the disk may be provided with two openings or recesses so that for a single revolution of the disk the needle will be twice automatically returned and replaced at the beginning of the record in order to repeat the matter on the record. It is of course obvious that by changing the relations of the disk notches or recesses to cor-



respond with the dimensions of the record, the same record may be played over a number of times during a single revolution of the governing disk. This feature is important as it produces a machine for repeating records.

The sound-box 70 is suitably mounted on an upright 71 and is provided with a suitable diaphragm 72 connected by a wire 73 passing through an opening in the arm 67 to the lever 74 carrying the stylus or needle 75. The supporting frame of the sound-box is utilized as the support for the swinging needle-arm 67 which may be swung vertically and horizontally by pivotally mounting it upon a plate or disk 76 which is pivotally mounted on the open side of the box. The plate is pivoted by means of two opposite lateral or side ears 77 upon the frame of the sound box and the arm is pivoted in the upper and lower ears 78 of the plate, so that it is connected to the box by a universal joint and may swing freely horizontally or from side to side on its pivots 78 on the plate as well as vertically or up and down with the plate upon its pivots 11. The upright 71 is provided with a spring 79 which bears upon the lower edge of the plate and so places it under tension to hold the needle on the record but yields to allow the needle to be raised to clear the record when the return-worm acts. The spring takes the place of the usual weight to hold the needle on the record but unlike the weight it acts to tension the needle on the record in any position in which the machine may be placed, whether upside down or on either end or side, and it also allows the needle to be automatically returned to its initial position as it does not weight it down or retard its free movement across the record.

In practice I may include the working parts in a case indicated by the dotted lines 80 in Fig. 4 which is provided with suitable openings for the horn 81 and for the starting key 48, and as the latter may be removed by having a screw-thread connection with the arm 47 as shown in Fig. 2 the machine may be set in any position without interfering with its operation.

I claim:

1. In a device of the class described, a record carrier, a needle-arm, a motor to actuate the carrier, a notched disk rotated by the motor, a swinging frame coöperating with the disk, a reversing worm carried by the frame and driven from the motor, and means to connect the worm and needle-arm when the frame co-acts with the notched portion of the disk to raise and retract the arm to its initial position.

2. In a device of the class described, a record carrier, a needle-arm, a motor to actuate the carrier, a notched disk rotated by the motor, a vertically swinging frame

coöperating with the disk, a reversing worm carried by the frame and driven from the motor, and a projection on the arm to travel in the worm when the frame rises in the notch of the disk.

3. In a device of the class described, a record carrier, a needle-arm, a motor to actuate the carrier, a notched disk rotated by the motor, a vertically swinging frame having a lug to enter the notch in the disk, a spring to move the lug into the notch, a reversing worm carried by the frame and driven from the motor, and means to connect the worm and needle-arm when the lug enters the notched portion of the disk.

4. In a device of the class described, a record carrier, a needle-arm, a motor to actuate the carrier, a notched disk rotated by the motor, a vertically swinging frame having a lug to enter the notch in the disk, a spring to move the lug into the notch, a pinion driven by the motor, a reversing worm carried by the frame and having a pinion actuated by the first pinion, and a projection on the needle-arm to engage the worm to raise the needle-arm and retract it to its initial position.

5. In a device of the class described, a sound-box having a diaphragm, a plate having pivotal connection to the box to swing vertically thereon, a needle-arm having a pivotal connection to the plate to swing horizontally thereon, a spring acting on the plate to hold the needle-arm in operative relation with the record, a rotating reversing worm, and means to elevate the worm into engagement with means or the needle-arm to raise the latter from the record against the tension of the spring and return it to its initial position.

6. In a device of the class described, a swinging needle-arm, a rotating disk having a notch, a swinging frame coöperating with the disk, a reversing worm carried by the frame, means to connect the worm and needle-arm when the frame enters the notch of the disk, a brake-mechanism including a spring-actuated latch, and means to automatically trip the latch when the worm has retracted the needle-arm.

7. In a device of the class described, a swinging needle-arm, a rotating disk having a gate, a second rotating disk having a notch in advance of the gate, a spring-actuated frame to enter the notch of the second disk, a reversing worm carried by the frame, means to connect the worm and needle-arm when the frame enters its notch, and a brake-latch to engage the gate when the disk has completed a revolution.

8. In a device of the class described, a swinging needle-arm, a rotating flange, a brake for the flange, a rotating shaft, a disk on the shaft having a gate, a second disk on the shaft having a notch, a spring-actuated

frame carrying a reversing worm and entering the notch of the second disk, means to connect the worm and arm when the frame enters the notch, and means tripped  
5 by the gate of the first disk to permit the brake to act when the frame is at the end of the notch.

9. In a device of the class described, a swinging needle-arm, a rotating flange, a  
10 brake for the flange, a spring-pressed rock-frame on which the brake is carried, a rotating trip-disk, a latch on the frame tripped by the disk to release the frame to allow the brake to act on the flange, and means to  
15 retract the needle-arm before the brake-frame is tripped by its disk.

10. In a device of the class described, a swinging needle-arm, a rotating flange, a  
20 brake for the flange, a spring-pressed rock-frame on which the brake is carried, a rotating trip-disk, a latch on the frame tripped by the disk to release the frame to allow the brake to act on the flange, a second rotating  
25 disk, a reversing worm, and means coöperating with said second disk to engage the worm and needle-arm to retract the latter before the brake-frame is tripped by its disk.

11. In a device of the class described, a  
30 swinging needle-arm, a rotating flange, an adjustable friction pad to engage the flange, a movable friction pad to engage the flange, a spring-actuated rock-shaft on which the second pad is carried, an arm on the shaft,  
35 a key to actuate the arm to rock the shaft against the action of its spring to release the flange from the action of the movable pad, a rotating trip-disk, a latch on the shaft tripped by the disk to release the shaft to  
40 allow the second pad to brake the flange, and means to automatically retract the stylus-arm before the latch is tripped by the disk.

12. In a device of the class described, a  
45 swinging needle-arm, a rotatable notched disk, a swinging frame coöperating with the

disk, a reversing worm carried by the frame, means to connect the worm and needle-arm when the frame co-acts with the notched  
50 portion of the disk, a rotating stop-disk having a gate, and a brake latch to engage the gate when the stop-disk has completed its rotation, the gate being offset from the notch to allow the worm to return the needle  
55 arm to its initial position before the latch engages the gate.

13. In a device of the class described, a swinging needle-arm, a rotatable notched  
60 disk, a swinging frame coöperating with the disk, a reversing worm carried by the frame, means to connect the worm and needle-arm when the frame co-acts with the notched  
65 portion of the disk, a rotating stop-disk having a gate, and a brake-latch to engage the gate when the stop-disk has completed a revolution, the notch of the first disk having a dwell or idle portion of sufficient  
70 length to allow the worm to return the needle arm to its initial position before the latch engages the gate of the stop-disk.

14. In a device of the class described, a swinging needle-arm, a rotatable disk having an elongated notch whose face is concentric with the periphery of the disk, a  
75 vertically swinging spring-actuated frame having a lug to enter the notch of the disk, a reversing worm carried by the frame, means to connect the worm and needle-arm when the lug of the frame is in the notch of  
80 the disk, a rotating stop-disk having a gate, and a spring-actuated brake-latch to engage the gate when the stop-disk has completed a revolution, the relation of the gate and notch being such that the latch enters the  
85 gate after the worm has retracted the needle-arm to its initial position.

In testimony whereof I affix my signature in presence of two witnesses.

ARCHIE E. PARNALL.

Witnesses:

EDITH WILCOX,  
J. McROBERTS.

TALKING MACHINE ATTACHMENT,  
# 1,130,910-C.I.Lamb,  
Patented-March 9, 1915.  
FILED-February 11, 1914.



C. I. LAMB.  
TALKING MACHINE ATTACHMENT.  
APPLICATION FILED FEB. 11, 1914.

1,130,910.

Patented Mar. 9, 1915.

2 SHEETS—SHEET 1.

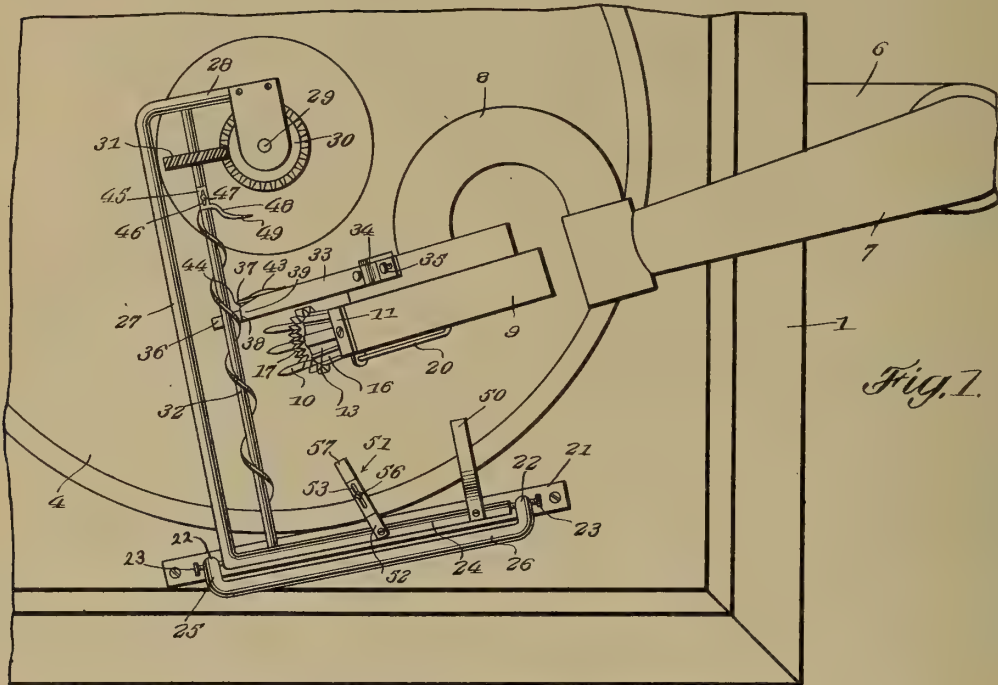


Fig. 1.

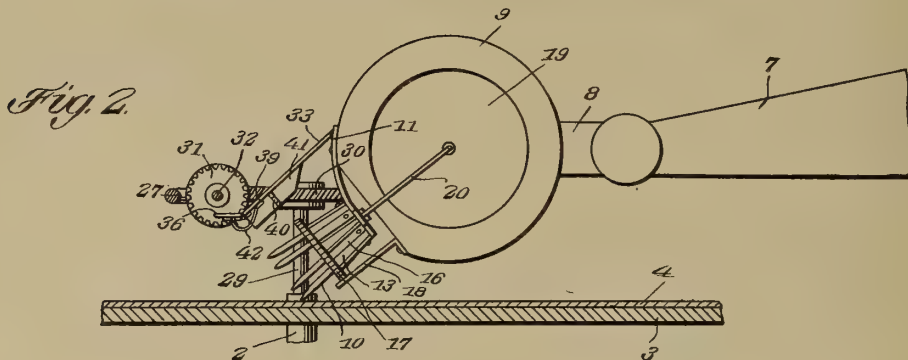


Fig. 2.

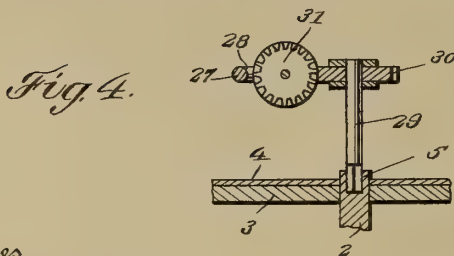


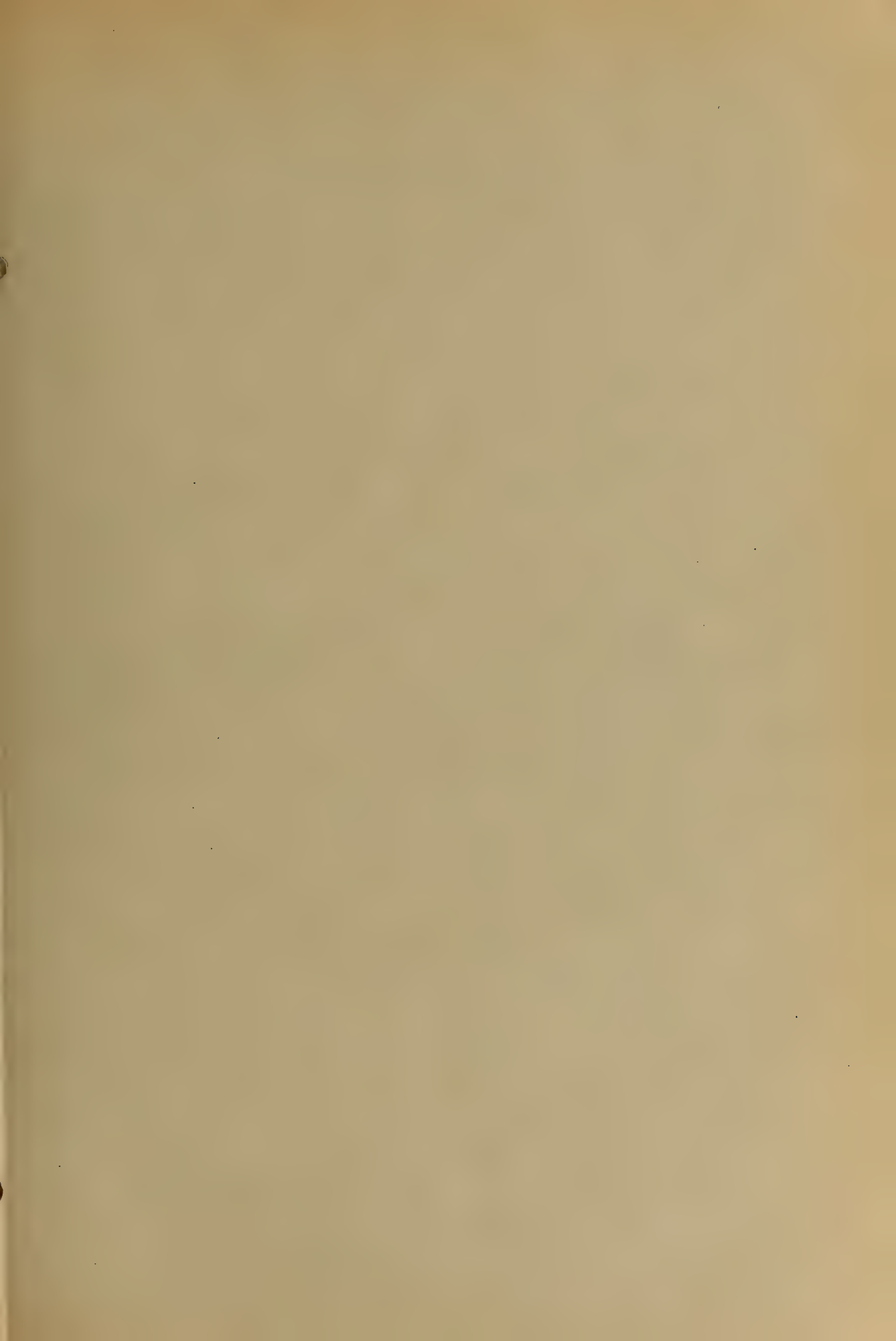
Fig. 4.

Witnesses

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By Victor J. Evans  
Attorney



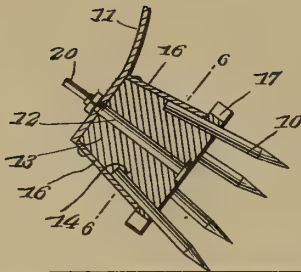
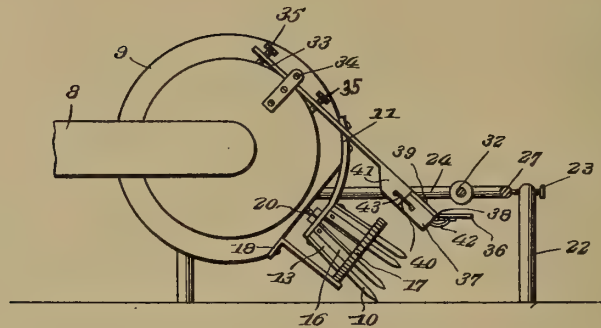
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TALKING MACHINE ATTACHMENT.  
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1,130,910.

Patented Mar. 9, 1915.

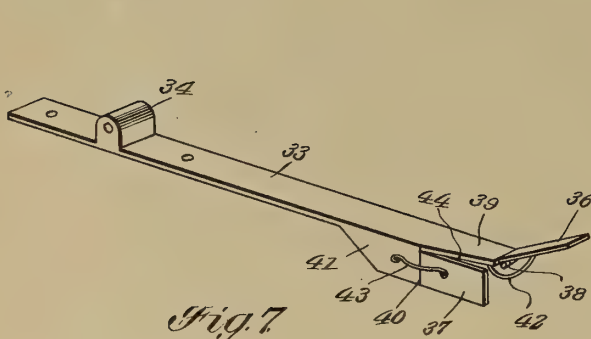
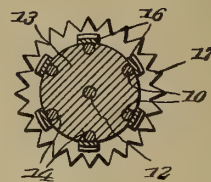
2 SHEETS—SHEET 2.

*Fig. 3.*

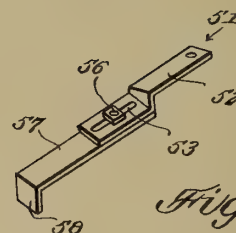


*Fig. 5.*

*Fig. 6.*



*Fig. 7.*



*Fig. 8.*

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Witnesses

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*James A. Koch*

By *Victor J. Evans*  
Attorney



# UNITED STATES PATENT OFFICE.

CHARLES IRA LAMB, OF NASHVILLE, TENNESSEE.

## TALKING-MACHINE ATTACHMENT.

1,130,910.

Specification of Letters Patent.

Patented Mar. 9, 1915.

Application filed February 11, 1914. Serial No. 818,071.

*To all whom it may concern:*

Be it known that I, CHARLES IRA LAMB, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented new and useful Improvements in Talking-Machine Attachments, of which the following is a specification.

This invention relates to repeating attachments for graphophones or other sound reproducing mechanism but particularly for disk graphophones; and it has for its primary object the provision of mechanism which will effect an automatic return of the sound box to the starting end of the record after the playing of the record.

Another object of the invention is the provision of repeating mechanism for graphophones having feeding mechanism receiving its power from the spindle of the revolving platform or table of the machine and arranged with such relation to the sound box that on a prescribed or predetermined position of the sound box on the record the sound box will be lifted above the record and then conveyed back to its starting point.

Another object of the invention is the provision of repeating mechanism having means therein for cushioning the movement of the sound box against the record during the period of the movement of the sound box off of the feeding mechanism.

A further object of the invention is the provision of a needle holder constructed so as to accommodate a plurality of needles and to hold such needles whereby they may be singly advanced against the record successively with returning the sound box to the starting point of the record.

A still further object of the invention is the provision of repeating mechanism which may be readily connected with any well known form of disk machine without necessitating material alterations in the construction thereof.

Another object of the invention is the provision of feeding mechanism which will be adjustable above the record so that it may be freely moved to an inactive position to permit of the application of the record to the

revolving table or the removal of the same therefrom as the occasion may require.

With these and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be hereinafter described and claimed.

In the accompanying drawings:—Figure 1 is a top plan view of the repeating mechanism, showing the application thereof to a graphophone; Fig. 2 is a side view of the sound box, showing its position with relation to the returning means during the movement of the sound box toward the end of the record, parts being shown in section; Fig. 3 is a similar view, looking toward the reverse side of the sound box; Fig. 4 is a vertical section through the spindle of the revolving table, showing the driven means for transmitting motion to the feeding means of the repeating mechanism; Fig. 5 is a section through the needle holder; Fig. 6 is a section on line 6—6 of Fig. 5; Fig. 7 is a perspective view of the traveling arm; and Fig. 8 is a perspective view of the actuating arm of the needle holder.

While it is to be understood that the repeating mechanism is broadly designed for use upon various well known forms of sound reproducing means or contrivances, it will be described in connection with a disk talking machine such as the one shown conventionally at 1 in Fig. 1. This machine is of a type employing a motor driven vertical spindle 2, on which is mounted a table or platform 3 for supporting the usual record tablet or disk 4, as shown clearly in Fig. 2. The said spindle is extended through the usual central aperture of the tablet or record, and it is provided with a vertical socket 5 having angularly-disposed walls for a purpose to be hereinafter explained. The graphophone is provided with a bracket 6, on which the usual sound tube 7 is mounted for horizontal swinging movements. This tube is provided with a vertically swinging branch 8, which carries a sound box 9.

The sound box is of a design which will support a plurality of record needles 10, and as shown a bracket 11 of the sound box is



provided with a spindle 12, on which a head 13 is adapted to revolve. This head is substantially of frusto-conical form and it is provided with a circular series of longitudinal grooves 14, which receive the upper ends of the needles 10. The needles are confined in the grooves by springs 16 or the like thereof. The head which supports the needles is provided with an annular series of substantially V-teeth 17 for a purpose to be hereinafter explained. A spring 18 is secured to the sound box and the free end thereof bears against adjacent teeth of the revolving head 13 and under the action of the spring the head is ordinarily or normally held against revolving. In other words, it is fixed so that one of the needles will be properly presented for engagement with the sound record. The bracket 11 is connected with the diaphragm 19 of the sound box by a stylus arm 20.

Extending at a tangent to the table or platform 3 and fixed to the body portion of the graphophone is a horizontal support or bracket 21 having parallel vertical posts 22, 22 in which bearing screws 23, 23 are mounted and extended into the ends of a rocking shaft 24. The posts 22 are offset at their upper ends at 25 and the offset portions are connected together by a relatively long arm 26 which forms a stop for a purpose to be presently explained. The rocking shaft 24 is provided with a long right angularly-extending branch 27 which overlies the revolving table or platform 3. The said branch terminates at a point adjacent to the axis of the platform and it is provided with an extension 28, in which a driven shaft 29 is mounted to freely revolve. This shaft carries a worm gear 30, which meshes with a similar gear 31 secured to a worm shaft 32. This shaft is mounted to freely revolve in the portions 24 and 28 of the rocking shaft, and the said worm shaft overlies the table or platform and it lies parallel to the portion 27 of the rocking shaft. The rocking shaft, worm shaft 32 and the intermeshing gears just mentioned constitute the parts of a feeding mechanism for returning the sound box to the starting end of the record after the sound box has been first moved to a predetermined position on the record.

The sound box is provided with an angularly-disposed arm 33 pivotally mounted upon the box at 34. Mounted in the arm 33 respectively at opposite sides of the pivot 34 are set screws 35, 35 which may be adjusted singly so as to effect any desired tilting position of the arm and to thereby permit the worm engaging portion of the arm to be properly set with relation to the worm. The arm extends in a downward direction toward the worm and it is provided with a downwardly tilting lug 36 and a laterally or horizontally tilting lug 37, the former

being hinged at 38 to the portion 39 of the arm, while the lug 37 is hinged at 40 to the portion 41 of the arm. A spring 42 is mounted between the lug 36 and the arm 33 and under the action of the said spring the lug 36 is properly maintained in one position. Under the action of a similar spring 43 carried by the arm 33 the lug 37 is maintained in a similar position. The portion 39 of the arm 33 has one of its sides extended at an angle, as at 44, to the adjacent upper edge of the lug 37, so that a substantially V-shaped space is formed between said upper edge of the lug and the adjacent edge 44 of the arm.

Through the arrangement of the parts now specifically referred to it is evident that through the swinging movement of the sound tube 7 the lug 36 will be constantly disposed in different relations to the worm 32. It is assumed that the sound box 9 is placed at the outer portion or starting portion of the record as in the usual operation of starting the sound box over the record. The position of the worm 32 with relation to the arcuate travel of the sound box is such that when the sound box is in this position, the free end of the lug 36 will be disposed slightly beyond one side of the feed screw 32, and as a consequence thereof, the stylus of the sound box will rest upon the record. As the sound box 7 moves in the direction of the axis of the revolving table, the free end of the lug 36 moves beneath the screw, and while it does not engage the screw in the movement of the sound box in the direction of the axis of the turn table it is constantly disposed in such relation to the screw that it may be freely deposited onto the upper surface of the groove at a predetermined time. Usually sound records are provided with one or two idle grooves near the center of the record, and the worm screw has its last convolution extended slightly beyond such idle groove and beyond said last convolution of the worm screw is a plate 45 having a longitudinal slot 46 which receives a set screw 47 upon the worm screw. The plate 45 is provided with an arm which is curved in the direction of the sound box, as at 48, and it is then reversely curved, as at 49, the latter portion being the effective actuating end which is designed to engage in the space between the surface 44 of the arm 33 and the adjacent upper edge of the swinging lug 37. As soon as the sound box is moved on the record to a point where the actuating end 49 of the arm engages against the side of the lug 37, the latter is, upon further movement of the sound box, moved inwardly against the action of the springs 43 until the arm of the plate 46 has reached a position where the end 49 will engage the under surface of the portion 39 of the arm



33. As the screw 32 constantly revolves, it is evident that the arm 33 and sound box will be elevated, due to the end 49 engaging the rigid portion 39 of the arm 33. As the arm is elevated through the action of the portion 49 of the arm secured to the plate 45, the lug 36 will yield in a downward direction so as to allow it to pass the worm 32. Immediately the lug 36 passes the worm 32, the spring 42 restores it to normal position so as to engage the thread of the worm. The lug is then deposited upon the screw in such manner that the thread of the screw will serve to carry the sound box to the starting end of the record. During such operation of the returning mechanism the needles of the sound box will be spaced above the sound record. As the sound box approaches the outer end of the screw the lug 36 has a tendency to escape from the screw and when the sound box reaches the starting end of the record, the lug 36 entirely escapes from the screw and the sound box falls into place upon the starting end of the record.

In order to cushion the movement of the stylus against the record, I provide the rocking shaft 24 with a spring 50, the free end of which is located directly in the path of movement of the sound box, and it is adapted to directly receive the same and to resiliently permit the stylus to contact with the record.

In order that a fresh needle may be presented to the record on the return of the sound box to the starting end of the record, I provide the peculiarly formed needle holder actuating device 51, the latter consisting of a bracket 52 secured to the rock shaft 24 and provided with a longitudinal slot 53 which receives a retaining device 56 on an adjustable portion 57 of the bracket. The portion 57 is provided with an offset or depending free end 58, which is adapted to engage against the toothed surface of the needle holding head 13 and under the action of the feed screw the head will be made to advance against the portion 58 of the actuating device and the head 13 will be revolved for a distance to properly present a new stylus to the record.

I claim:

1. In automatic stylus restoring mechanism, the combination of a support adapted to be mounted adjacent the periphery of the turntable of a sound reproducing mechanism, a frame pivotally mounted thereon and adapted to overlie said table, a restoring worm carried by and rotatably mounted therein, a detachable connection at the free end of the frame adapted when in an operative position to make contact with the turntable spindle, and transmission means between said connection and said worm.

2. In automatic stylus restoring mechanism, the combination of a support adapted to be mounted adjacent the periphery of the turntable of a sound reproducing mechanism, a frame overlying the table, screws passing through said support and pivotally engaging said frame whereby the latter may move vertically in an arc of a circle, a restoring worm carried by and rotatably mounted in said frame, a detachable connection at the free end of the frame adapted when in an operative position to make contact with the turntable spindle, and transmission means between said connection and said worm.

3. In a talking machine, the combination with the turntable and sound box thereof, means overlying the table and operating to restore the sound box to initial position from the inner end of a record, a needle holder on said sound box adapted to hold a plurality of needles and rotatable to advance successive needles to operative position, and means on said restoring means to advance said holder to present a fresh needle in operative position at each restoration of the sound box to initial position.

4. In automatic stylus restoring mechanism, the combination of a support adapted to be mounted adjacent the periphery of the turntable of a sound reproducing mechanism, a U-shaped frame, screws passing through said support and pivotally engaging one limb of said frame, a restoring worm journaled in the parallel limbs of said U-shaped frame, a shaft having one extremity rotatably mounted in said frame and its remaining extremity adapted to be detachably connected to the spindle of the turntable, and transmission means between said shaft and worm.

5. In a talking machine, the combination with the turntable and pivoted sound box thereof, a pivoted U-shaped frame overlying said table, a worm journaled in said frame, transmission means between said worm and the turntable spindle, an arm secured to said sound box, and a lug carried by said arm and adapted to be alternately positioned on opposite sides of said worm, said worm being so arranged with relation to said sound box that said lug during the arcuate travel of said sound box will leave said worm adjacent the periphery of said turntable.

6. In a talking machine, the combination with the turntable and pivoted sound box thereof, a pivoted U-shaped frame overlying said table, a worm journaled in said frame, transmission means between said worm and the turntable spindle, an arm secured to said sound box, and a lug resiliently secured to said arm and limited in its travel in one direction, said lug being adapted



ed to be alternately positioned on opposite  
sides of said worm, said worm being so  
arranged with relation to said sound box  
that said lug during the arcuate travel of  
5 said sound box will leave said worm adja-  
cent the periphery of said turntable.

In testimony whereof I affix my signature  
in presence of two witnesses.

CHARLES IRA LAMB.

Witnesses:

CLARA B. HOOD,  
ROSIE E. DODD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

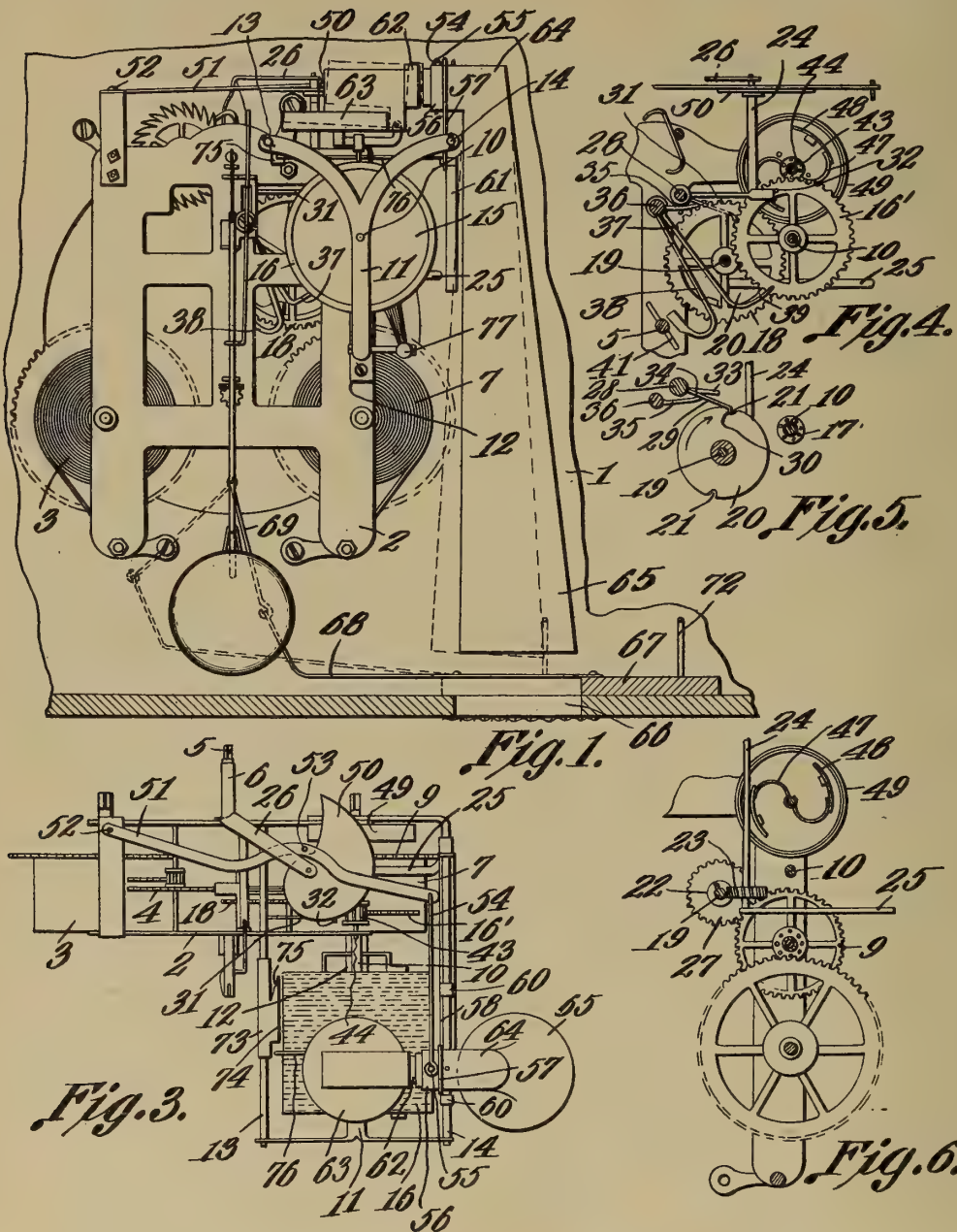
PHONOGRAPH ATTACHMENT FOR CLOCKS,  
# 1,131,001 - J. H. Pearson,  
Patented-March 9, 1915.  
Filed-April 24, 1913.

J. H. PEARSON.  
 PHONOGRAPH ATTACHMENT FOR CLOCKS.  
 APPLICATION FILED APR. 24, 1913.

1,131,001.

Patented Mar. 9, 1915.

2 SHEETS-SHEET 1.



Witnesses

*J. P. Towne*  
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J. H. PEARSON.  
 PHONOGRAPH ATTACHMENT FOR CLOCKS.  
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 2 SHEETS—SHEET 2.

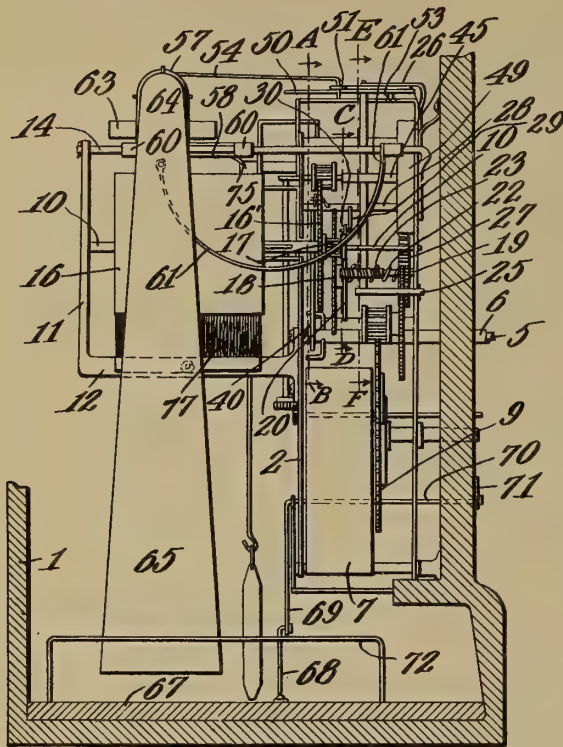


Fig. 2.

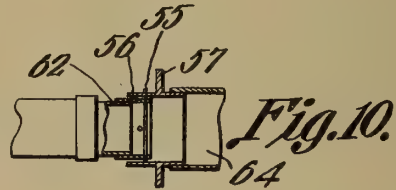


Fig. 10.

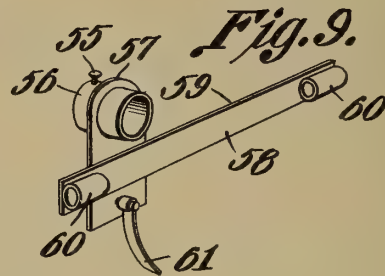


Fig. 9.

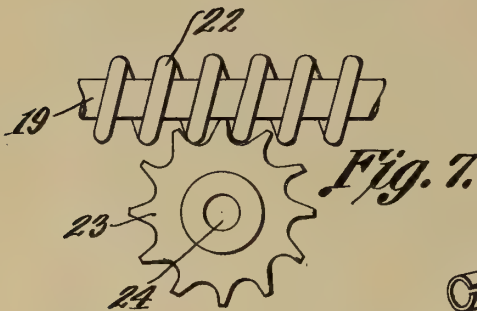


Fig. 7.

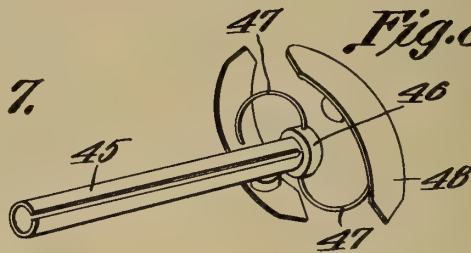


Fig. 8.

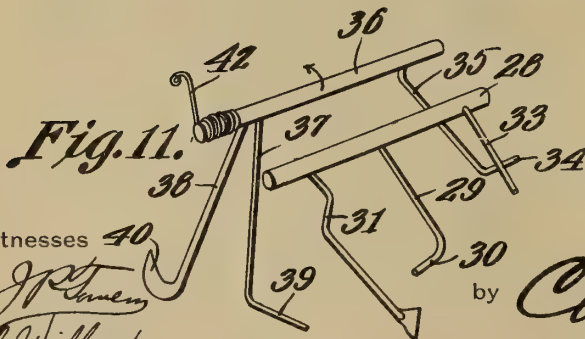


Fig. 11.

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# UNITED STATES PATENT OFFICE.

JAMES H. PEARSON, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-THIRD TO WILLIAM W. CARTER AND ONE-THIRD TO HARVEY L. DONEY, OF BLOOMFIELD, INDIANA.

## PHONOGRAPH ATTACHMENT FOR CLOCKS.

1,131,001.

Specification of Letters Patent.

Patented Mar. 9, 1915.

Application filed April 24, 1913. Serial No. 763,406.

*To all whom it may concern:*

Be it known that I, JAMES H. PEARSON, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a new and useful Phonographic Attachment for Clocks, of which the following is a specification.

This invention relates to striking clocks of the graphophone type, one of the objects of the invention being to provide mechanism of simple, durable and compact construction whereby a carriage carrying a reproducer and a horn, can be caused to travel at predetermined intervals during which time the cylinder, disk or the like on which the announcements have been recorded, will be operated.

A further object is to provide mechanism of this character which can be combined readily with the mechanism of clocks of different types now in use, the entire mechanism constituting the present invention being so proportioned as to be readily housed within a casing of ordinary proportions.

Another object is to provide improved means for releasing and stopping the mechanism employed for operating the record and the carriage.

A further object is to provide means by which the carriage, upon reaching one limit of its movement, is returned automatically to its initial position so that the intelligence recorded will be repeated during successive operations of the mechanism.

A further object is to provide a novel form of governor for controlling the speed of rotation of the record, said governor being connected to the record operating mechanism in a novel manner to prevent the governor from coming to an abrupt stop when the record is stopped and, consequently, relieving the mechanism of the excessive strains which would otherwise be produced.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a rear elevation of a clock mechanism having the present improvements combined therewith, only a portion of the clock casing being shown. Fig. 2 is a side elevation of the mechanism shown in Fig. 1. Fig. 3 is a plan view thereof. Fig. 4 is a section on line A—B Fig. 2. Fig. 5 is a section through a portion of the mechanism on the line C—D Fig. 2. Fig. 6 is a section through a portion of the mechanism on the line E—F Fig. 2. Fig. 7 is an enlarged plan view of the worm wheel and of a portion of the worm engaging the same. Fig. 8 is a perspective view of the revoluble portion of the governor. Fig. 9 is a perspective view of the carriage. Fig. 10 is a view partly in elevation and partly in section through the connection between the horn and the reproducer. Fig. 11 is a perspective view of a portion of the controlling mechanism.

Referring to the figures by characters of reference 1 designates a portion of the casing of the clock, and arranged therein is a frame 2 carrying the usual main spring 3 and the gear train indicated generally at 4 for actuating the arbors 5 and 6 of the minute and hour hands respectively. Mounted in the frame is also a spring 7 adapted to actuate the striking train 9 which includes an arbor 10 extending rearwardly beyond the frame and journaled both in the frame 2 and within an upwardly extending Y-shaped end member 11 supported upon a rearwardly extending strip 12 fixedly connected to the frame 2. The upper ends of the member 11 are connected to said frame 2 by parallel rods 13 and 14. That portion of the arbor between frame 2 and the strip 11 carries a mandrel 15 on which is mounted a record 16 which, as shown, is in the form of a cylinder having recorded thereon the intelligence to be reproduced, this intelligence being preferably in the form of successive sentences announcing the hour and the half hour or, if desired, the said sentences can announce solely the hour or, if preferred, the hour, the half hour and the quarter hour. In the structure illustrated the mechanism is arranged to rotate the mandrel every half hour so that the hours and half hours will thus be announced.

The arbor 10 is provided, in addition to the large gear 16' with a small pinion 17 meshing with and adapted to rotate with a



large gear 18 secured to an arbor 19. The arbor 19 and gear 18 rotate together and secured to the arbor 19 is a controlling disk 20 having diametrically opposed V-shaped notches 21 the advancing edges of which are inclined in the direction of movement while the opposed edges of the notches are preferably radially disposed. This is clearly indicated in Fig. 5. Arbor 19 is also provided with a worm 22 constantly engaged by a worm gear 23 secured to the lower end portion of a vertical shaft or arbor 24 journaled in the frame 2, there being suitable brackets 25 and 26 provided for the lower and upper ends respectively of this arbor 24. A small gear 27 is secured to the arbor 19 and receives motion from the train 9.

An arbor 28 is journaled in the upper portion of the frame 2 and extending from this arbor is an arm 29 having a laterally extending finger 30 which bears normally upon the periphery of disk 20, said finger usually being seated in one of the notches 21 so as thus to hold the disk 20 against rotation in the direction of the arrow shown in Fig. 5. Another arm 31 extends from the arbor 28 and extends back of and close to the large gear 16', said arm having a flattened end portion which is adapted to constitute an abutment for a pin 32 which extends rearwardly from the gear 16'. Thus, while finger 30 is seated in one of the notches 21, pin 32 is bearing against the end of arm 31. An additional arm 33 extends radially from the arbor 28 and extending under this arm is a lifting finger 34 extending laterally from a radial arm 35 mounted on another arbor 36. This last named arbor has diverging arms 37 and 38, the arm 37 terminating in a finger 39 which extends back of the gear 16' and is adapted to move into the path of the pin 32. The other arm 38 has a curved flattened finger 40 extending close to the arbor 5 of the minute hand and extending from this arbor are oppositely disposed bowed tripping fingers 41. Two of these fingers are used where the clock is intended to announce the hours and the half hours. If it is only designed to announce the hours, only one finger 41 will be employed whereas when an announcement is to be made every quarter hour, it is necessary to use four of these fingers 41.

A spring 42 may be connected to the arbor 36 so as to cause the same to rotate quickly to its initial position after it has once been tripped by a finger 41.

Meshing with the gear 16' is a small gear 43 secured to an arbor 44. This arbor projects into a split sleeve 45 formed of spring metal. A hub 46 is arranged at one end of the sleeve and extending therefrom are oppositely arranged curved spring arms 47 to the outer ends of which are connected arcuate shoes 48. These shoes are adapted to ro-

tate within a stationary drum 49 and, when the arbor rotates at a predetermined speed, the shoes are shifted outwardly by centrifugal force so as to contact with the drum 49 and thereby retard the rotation of the arbor. Should the arbor be brought to a sudden stop, the sleeve 45 is free to rotate thereon to a slight extent under the momentum imparted thereto by the rotating shoes 48 and arms 47. Thus danger of injury to the mechanism as the result of sudden stopping is reduced materially.

Secured to the upper end of the vertical arbor 24 is a cam having a volute periphery, said cam being indicated at 50. A lever 51 is fulcrumed, as at 52, upon the frame 2 and extends across the top of the cam 50, this lever having a depending pin 53 which bears against the periphery of the cam. The free end of the lever is connected, by a rod 54, to a pin 55 upstanding from a sleeve 56, this sleeve being supported in an upstanding plate 57 constituting a portion of a carriage. A longitudinal strip 58 is fastened to or formed with the plate 57 and likewise constitutes a part of a carriage, the said carriage being indicated generally at 59. Guide sleeves 60 are provided at the ends of the strip 58 and are slightly mounted on the rod 14. A spring 61 is secured at one end to the plate 57 and at its other end to rod 14 close to the frame 2 and this spring presses the carriage 59 toward the strip 11 thus causing rod 54 to pull on lever 51, whereby pin 53 is constantly pressed against the periphery of the cam 50.

Fitted within one end of the sleeve 56 is the tubular stem 62 of a reproducer 63 such as commonly used in connection with phonographs, and connected to the other end of the sleeve 56 is a tube 64 which is turned downwardly and gradually enlarged to form a horn 65. The mouth of the horn is located directly above an opening 66 in the bottom of the casing 1 and mounted on the bottom of the casing is a slide 67 having an arm 68 extending therefrom. This arm is pivotally engaged by a crank arm 69 extending from a rod 70 which is mounted for rotation in front of the clock casing and provided at its front end with an index or pointer 71. Thus it will be seen that by turning the pointer in one direction, the crank arm 69 will be caused to pull the slide 67 partly or entirely over the opening 66 while, by turning the point 71 in the opposite direction, the opening 66 can be uncovered. Thus the volume of sound escaping from the casing can be controlled. The slide 67 is preferably provided with an elongated bail or guide rod 72 the upper portion of which is parallel with the rod 14. When the slide 67 is shifted so as to close the opening 66, this rod 72 comes against the horn 65 and pushes it toward the frame 2, as shown by dotted



lines in Fig. 1, thus causing the carriage 59 to rotate on the rod 14 a sufficient distance to lift the stylus of the reproducer out of contact with the record. Thus although the mechanism of the announcer may continue to operate, the stylus will be held out of contact with the record and no sound will be produced.

Secured to the rod 13 is a sleeve 73 from which extends a guide flange 74 terminating in a downwardly turned spring finger 75. A pin 76 extends from the reproducer and is adapted, when the carriage is moving in one direction, to travel under the flange 74 and against the spring finger 75, thus pushing the finger upwardly out of the path of the pin. As soon as the pin passes the finger 75 however, the end of the finger springs downwardly so that, during the return movement of the carriage, pin 76 will travel onto the spring finger 75 and thus be elevated on the flange 74 until the carriage reaches the other limit of its movement whereupon the pin 76 will move off of the flange. During this movement of the pin along the flange 74, the stylus of reproducer is supported out of contact with the record but, as soon as the pin 76 passes off of the flange 74, the stylus drops onto the record and the apparatus thus becomes reset.

A brush 77 is preferably mounted upon the strip 12 and is designed to keep the record clear of dust.

It is to be understood that a few minutes before the time when the announcing mechanism is to be operated, one of the fingers 41 moves against the flattened finger 40 and gradually rotates the arbor 36 in the direction indicated by the arrow in Fig. 9 until finger 34 lifts arm 33 a sufficient distance to remove finger 30 from the notch 21 in which it is seated. At the same time the end of arm 31 is lifted out of the path of the pin 32. This movement of the arbor 36 brings the end of the finger 39 into the path of the pin 32 so that, as soon as finger 30 is lifted out of notch 21 and arm 31 is lifted out of the path of pin 32, gear 16' is released and will rotate until the said pin 32 comes against the finger 39 whereupon the gear 16' will be brought to a stand. This rotation of gear 16' is effected from spring 7 through the gear train 9, gear 27, arbor 19, and pinion 17. The arbor 5 of the minute hand continues to rotate and as soon as the hand indicates the time when the announcing mechanism is to be operated, the finger 41 moves past the end of finger 40 whereupon spring 42 will promptly rotate arbor 36 back to its initial position. This will result in finger 39 shifting out of the path of pin 32 and, therefore, gear 16' will be free to continue its operation. Furthermore finger 30 will rest upon the periphery of the disk 20 and as soon as the gear 16' completes its revo-

lution, disk 20 will complete a one-half revolution thus bringing one of the notches 21 under finger 30 and said finger will therefore drop into the notch and stop the operation of the mechanism. At the same time arm 30 will be brought into the path of the pin 32. During the rotation of gear 16', arbor 19 is rotated and as the worm 22 is formed on this arbor, it will rotate the vertical arbor 24 through gear 23. This vertical arbor will rotate the cam 50 therewith and the periphery of the cam will push against the pin 53 and cause lever 51 to swing about its fulcrum. Thus the lever will pull through rod 54 upon the carriage 59 and against the action of the spring 61.

The parts are so proportioned that during the rotation of gear 16', the carriage will be drawn a sufficient distance to enable the reproducer to announce the intelligence recorded on the record relative to the time indicated by the hands of the clock. As arbor 10 has the mandrel 15 mounted upon it, it will of course be apparent that the record will be rotated while the carriage is being shifted so that the information will thus be announced. Immediately upon the completion of the announcement, the mechanism is brought to a stop in the manner hereinbefore set forth, the parts being reset so as to be released and operated in the manner hereinbefore described when the minute hand indicates the time at which the next announcement is to be made. As soon as the last announcement recorded on the cylinder has been reproduced, the pin 76, which has been traveling under the flange 74, passes the point of finger 75 and the pin 53 passes off of the outer end of the cam 50. Thus spring 61 is freed and promptly shifts the carriage back to its initial position, pin 76 traveling over finger 75 and flange 74 during this return movement so as to hold the stylus of the reproducer out of contact with the record during such return movement.

What is claimed is:—

1. The combination with power actuated mechanism of a rod, a carriage mounted to slide and rotate on the rod, a reproducer and a sound amplifier connected to the carriage, means operated by said mechanism for sliding the carriage in one direction, a guide member parallel with the rod and having a resilient depending end portion, means on the reproducer adapted to travel under said guide member to hold the reproducer in contact with a record during the movement of the reproducer in one direction and to move out of contact with said depending end portion when the reproducer reaches one end of the record in said means and the depending end portion of the guide member cooperating to lift the reproducer out of contact with the record during the movement of the reproducer in the opposite direction, and

means for automatically shifting the reproducer in the last named direction when released from the action of the means for sliding it.

- 5 2. The combination with a record support, and power actuated mechanism for driving the same, of a rod, a carriage mounted to slide and rotate upon the rod, a reproducer movable with the carriage and normally bearing upon the record, a guide having a resilient depending finger, means for shifting the carriage along the rod in one direction, means for automatically returning the carriage and reproducer to their initial position, and means upon the reproducer and movable under the guide member during the movement of the carriage in one direction for holding the reproducer in contact with the record, said last named means being adapted to push the finger upwardly out of its path during such movement, and to move over the depending finger and onto the guide member during the movement of the reproducer in the opposite direction for supporting said reproducer out of contact with the record.

- 30 3. The combination with a carriage mounted to slide and rotate, a reproducer movable with the carriage, and a horn extending from the carriage, of a casing having an outlet opening, a slide for closing the

opening, means for actuating the slide, and means upon the slide for engaging the horn to rotate the carriage when the slide is moved to closed position and move the reproducer out of operative position.

4. The combination with a guide member having a spring finger at one end thereof, said finger being downturned, of a carriage, a pin movable with the carriage and adapted, during the movement of the carriage in one direction, to ride under the guide and finger, said pin engaging the finger to lift the finger out of normal position and being movable past and out of contact with the finger, said pin being movable onto the finger and guide when the carriage is moved in the opposite direction, and means for moving the carriage back and forth relatively to the guide, said guide and finger cooperating to hold the carriage in lowered position during its movement in one direction and to lift the carriage during its return movement.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES H. PEARSON.

Witnesses:

B. F. SAYLOR,  
M. E. SAYLOR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

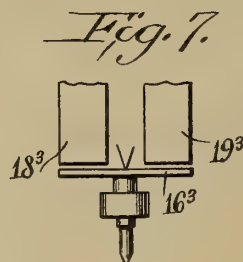
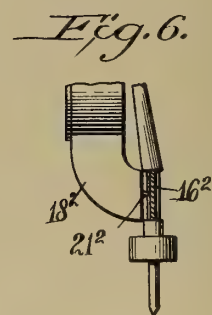
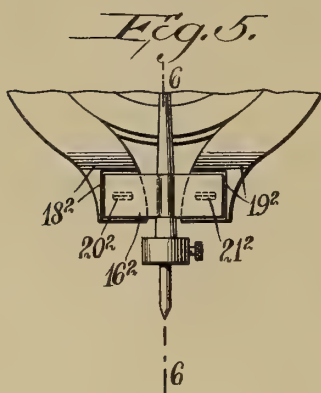
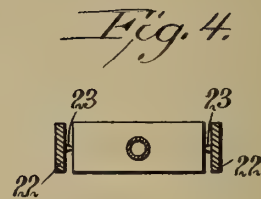
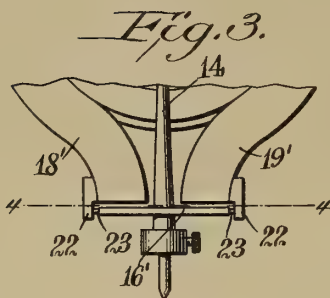
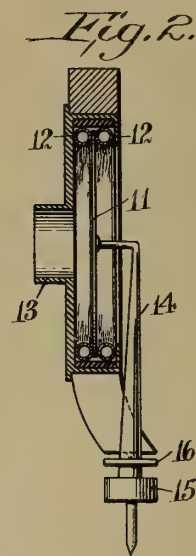
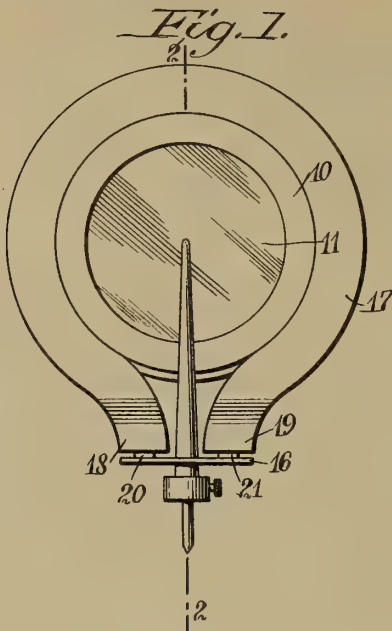


SOUND REPRODUCER AND RECORDER,  
# 1,131,442 - W. J. Travers,  
Patented-March 9, 1915.  
Filed-June 30, 1913.

W. J. TRAVERS.  
SOUND REPRODUCER AND RECORDER.  
APPLICATION FILED JUNE 30, 1913.

1,131,442.

Patented Mar. 9, 1915.



WITNESSES

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INVENTOR

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ATTORNEYS

# UNITED STATES PATENT OFFICE.

WILLIAM J. TRAVERS, OF BUFFALO, NEW YORK.

SOUND REPRODUCER AND RECORDER.

1,131,442.

Specification of Letters Patent.

Patented Mar. 9, 1915.

Application filed June 30, 1913. Serial No. 776,553.

*To all whom it may concern:*

Be it known that I, WILLIAM J. TRAVERS, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented a new and Improved Sound Reproducer and Recorder, of which the following is a full, clear, and exact description.

My invention relates to sound reproducers and recorders and has reference more particularly to the stylus bar and its armature, in which magnetic means are used for maintaining the stylus bar armature in a predetermined position.

An object of the invention is to provide a simple, reliable and inexpensive sound reproducer and recorder in which the amplitude or the time of vibration of the same is varied.

Another object of the invention is to provide means for maintaining the stylus bar armature upon its bearings.

Another object of the invention is to provide a sound producer and recorder in which the friction of the stylus bar armature bearings is reduced to a minimum.

A further object of the invention is to provide a stylus bar of reduced weight without reduction in strength.

Figure 1 is a front elevation of an embodiment of my invention; Fig. 2 is a section on line 2—2, Fig. 1; Fig. 3 is a modified form of stylus bar armature bearings; Fig. 4 is a section on line 4—4, Fig. 3; Fig. 5 is another modified form of mounting of the stylus bar armature journalings; Fig. 6 is a section on line 6—6, Fig. 5; and Fig. 7 is another form of mounting the stylus bar armature so that the same oscillates longitudinally with respect to the poles of the magnet.

Before proceeding to a more detailed description of my invention, it must be clearly understood that the magnets may be of any suitable shape or form, formed of a single magnet or as a magnetic battery. The magnet may be secured about the lateral wall of the device, or it may form part of its lateral wall. Furthermore, a magnet or set of magnets may be used for retaining the stylus bar armature upon its journals or bearings while another magnet or group of magnets may act upon the stylus bar armature so as to vary its time of vibration.

Referring to the drawings, 10 represents

a chambered body of ordinary construction, as used in sound reproducers and recorders, which receives a diaphragm 11 suitably clamped within the chambered body 10 by means of rubber rings 12 at each side of the diaphragm and adjacent the lateral wall of the chambered body. The chambered body 10 has at one end a centrally apertured collar 13 which is adapted to engage the horn. The other end of the diaphragm has a large opening substantially equal to the inner diameter of the rubber ring 12. These parts of the invention are common in the art and do not form part of my invention.

Secured to the center of the diaphragm 11 on the side opposite the one facing the collar 13 is a stylus bar 14, preferably hollow (see Fig. 4). The stylus bar projects out of the chambered body 10 with its axis substantially parallel to the ends of the chambered body and the sides of the diaphragm. The stylus bar at its free end is provided with a mass forming a needle holder 15 which increases the inertia of the stylus bar. The stylus bar 14 adjacent the needle holder 15 is provided with a plate 16 extending transversely of the axis of the chambered body.

Positioned on the lateral wall of the chambered body 10 is a magnet 17, the poles 18 and 19 of which are provided with central knife-edged projections 20 and 21. The projections 20 and 21 are in alinement with each other and lie in a line perpendicular to the axis of the chambered body and pass through the axis of the stylus bar. The said projections engage the plate 16 centrally by cutting slightly into the same. The plate 16, which is of such material that it is influenced by the magnetic force of the poles 18 and 19, is caused by the same to be in engagement with the projections 20 and 21. The plate 16, which forms the armature of the stylus bar, is, therefore, journaling on the knife projections 20 and 21 about which the stylus bar can oscillate. The magnetic attraction of the poles 18 and 19 will maintain the armature in a predetermined position, that is, when the stylus bar is in normal position the plate 16 will be parallel to the end surfaces of the poles 18 and 19.

Let us assume that the diaphragm 11 is caused to vibrate. This will cause the stylus



bar 14 to oscillate on its bearings or journals, which are the knife projections 20 and 21. This displacement of the stylus bar of the diaphragm will cause the side of the plate 16 facing the poles 18 and 19 to form an angle with the same, thereby increasing the attraction toward one edge while decreasing it at the opposite edge of the plate. The displacement of the bar produced by the diaphragm will be intensified by the magnetic action of the poles, thereby influencing the time of the oscillation and the oscillation of the stylus bar. Similar results will be obtained when the stylus bar is caused to oscillate by a record. The influence produced by the magnetic poles 18 and 19 on the armature of the stylus bar will increase the sensibility of the sound reproducer and recorder.

In Figs. 3 and 4, poles 18<sup>1</sup> and 19<sup>1</sup> are provided on the exterior sides with portions 22 projecting slightly below the poles proper and having sharp points 23. On these points is pivotally mounted the plate 16<sup>1</sup> by engaging the said points with its edge ends. This mounting of the armature of the stylus bar makes the same pivotal on an axis, which is transverse to the axis of the chambered body and which axis also passes through the axis of the stylus bar.

In Figs. 5 and 6 the stylus bar armature journals on the sides of the ends of the poles. The poles 18<sub>2</sub> and 19<sub>2</sub> have their faces lying in the plane parallel to the side of the magnet, these faces being centrally provided with knife edges 20<sub>2</sub> and 21<sub>2</sub>. The armature plate 16<sub>2</sub>, in this case, lies in a plane parallel to the face of the magnet or the sides of the diaphragm. The ends of the pole are preferably provided with a recess into which the ends of the plate are fitted, as can be easily seen from Figs. 5 and 6.

In Fig. 7 the journal for the armature plate 16<sub>3</sub> is a sharply pointed member, positioned between the poles 18<sub>3</sub> and 19<sub>3</sub>, on which the armature plate is balanced, there being no connection whatever between the armature plate and the poles of the magnet. This provision renders the armature plate more sensitive, as it is free to oscillate in any plane, being mounted on a single point; while the structures disclosed in Figs. 1 to 6 inclusive are only adapted to oscillate in a plane perpendicular to the plane of the diaphragm.

While, as stated in the description, the stylus bar is preferably hollow in structure, a solid stylus bar may be used if desired. Also in the above specification I described in detail a few ways of journaling the stylus bar. Changes in the details and arrangement of these various mountings may be made without departing from the underlying spirit of the invention, as pointed out in the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a sound reproducer and recorder, a stylus bar; a support for the stylus bar; a magnet; and means associated with the magnet and said support forming the axis of oscillation for said stylus bar, said magnet adapted to maintain said support and stylus bar in a predetermined position.

2. In a sound reproducer and recorder, a stylus bar; a support for the stylus bar; and a magnet having means engaging said support whereby said support is spaced from the poles of the magnet, said means forming the axis of oscillation for the stylus bar and whereon the oscillation of the bar is influenced by the said magnet.

3. In a sound reproducer and recorder, a stylus bar, bearings upon which the stylus bar is mounted to oscillate, a magnet the poles of which are adjacent said bearings, and means associated with said bar adjacent the bearings, said means being spaced from the poles of the magnet and influenced thereby.

4. In a sound reproducer and recorder, a stylus bar, an armature therefor, and a magnet having means at the poles engaging the armature, whereby the poles of the magnet are spaced from the armature.

5. In a sound reproducer and recorder, a stylus bar; an armature for said stylus bar; a bearing for said armature on which the stylus bar is adapted to oscillate; and magnetic means forcing the armature in engagement with the bearing and also adapted to influence the displacement of the stylus bar on the bearing that may be produced by the vibration of the diaphragm or the movement of the record.

6. In a sound reproducer and recorder, a stylus bar and magnetic means having bearings at the poles, said bar having means spaced from the poles of the magnet and in engagement with said bearings.

7. In a sound reproducer and recorder, a stylus bar; a support for the stylus bar mounted to oscillate on an axis; and magnetic means adapted to maintain said support on its axis and to influence its movement on the axis, thereby influencing the movement of the bar.

8. In a sound reproducer and recorder, a stylus bar, a support for the stylus bar, bearings for said support on which the stylus bar is adapted to oscillate, and magnetic means associated with said bearings, the poles of the magnetic means being spaced from the support, said poles tending to maintain said support in normal position on said bearing.

9. In a sound reproducer and recorder, a hollow stylus bar; a support for the stylus bar; a bearing for said support on which

said stylus bar is adapted to oscillate; and magnetic means the poles of which are spaced from said support and which tend to maintain the same in normal position.

5 10. In a sound reproducer and recorder, a cone-shaped hollow stylus bar; a support for the bar; bearings for said support on which the stylus bar is adapted to oscillate; and magnetic means the poles of which are  
10 spaced from said support and which tend to maintain the same in a predetermined position.

11. In a sound reproducer and recorder, a stylus bar, a support for said stylus bar, and  
15 a magnet having means engaging the support and spacing the same from the poles thereof, said means pivotally connecting said support to the magnet.

12. In a sound reproducer and recorder, a  
20 stylus bar, a support therefor, a magnet associated with the support, and means intermediate the support and the poles of the

magnet rendering said support pivotal and spacing the same from the poles of the magnet.

25 13. In a sound reproducer and recorder, a stylus bar, a support for the stylus bar, and a magnet the poles of which are shaped to form the axis of oscillation for the stylus bar, and whereon the oscillation of the bar  
30 is influenced by the said magnet.

14. In a sound reproducer and recorder, a magnet and a stylus bar, said stylus bar and magnet poles having contacting means forming the axis of oscillation for said sty-  
35 lus bar.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM J. TRAVERS.

Witnesses:

HENRY KREISS,  
HARRY W. LAUER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



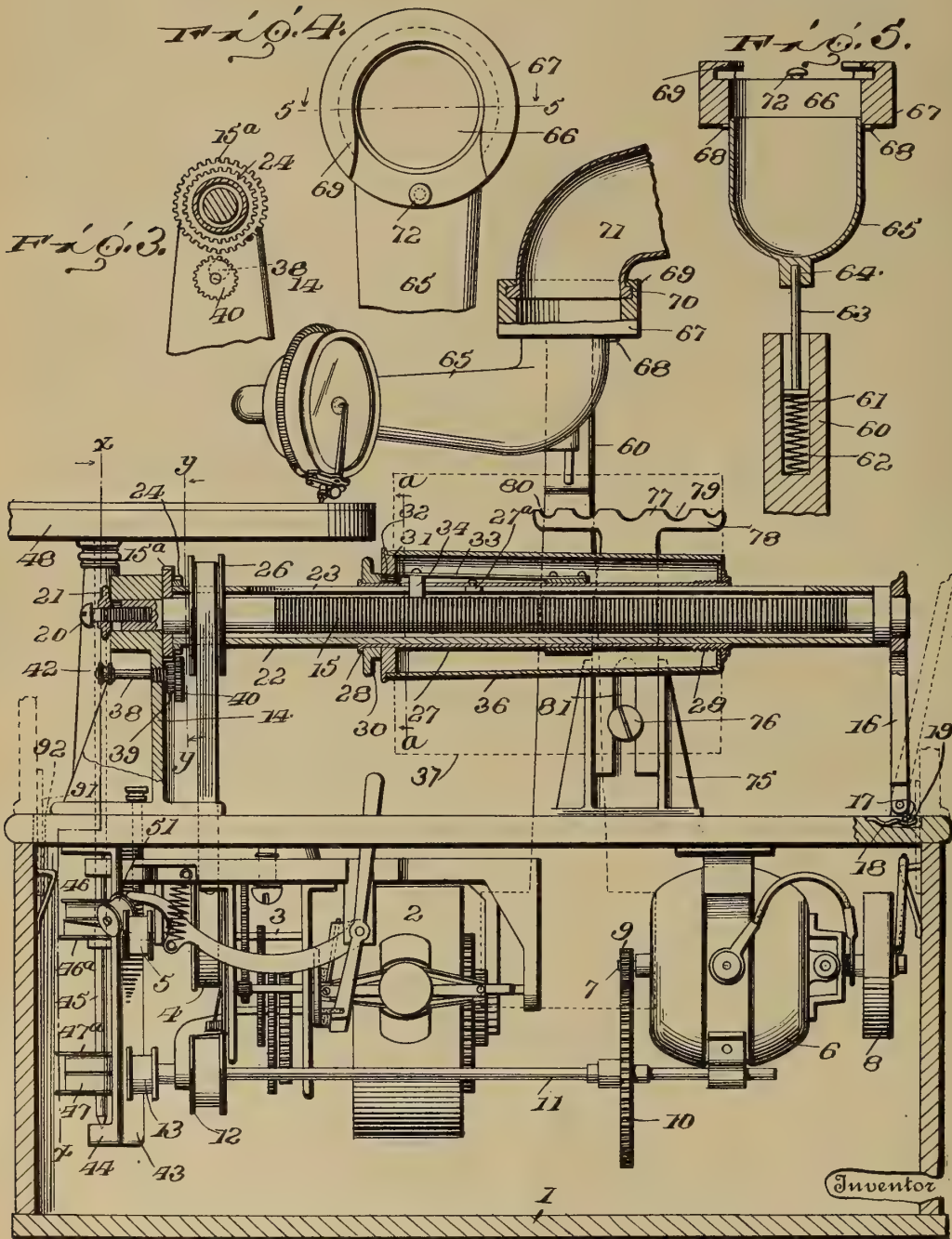


SOUND REPRODUCING MACHINE.  
# 1,131,454-W. C. Wolfe,  
Patented-March 9, 1915.  
Filed-July 8, 1911.

W. C. WOLFE.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED JULY 8, 1911.

1,131,454.

Patented Mar. 9, 1915.  
2 SHEETS—SHEET 1.



Witnesses  
W. C. Wolfe  
L. M. Meyer

By

W. C. Wolfe  
In Witness  
Attorney.



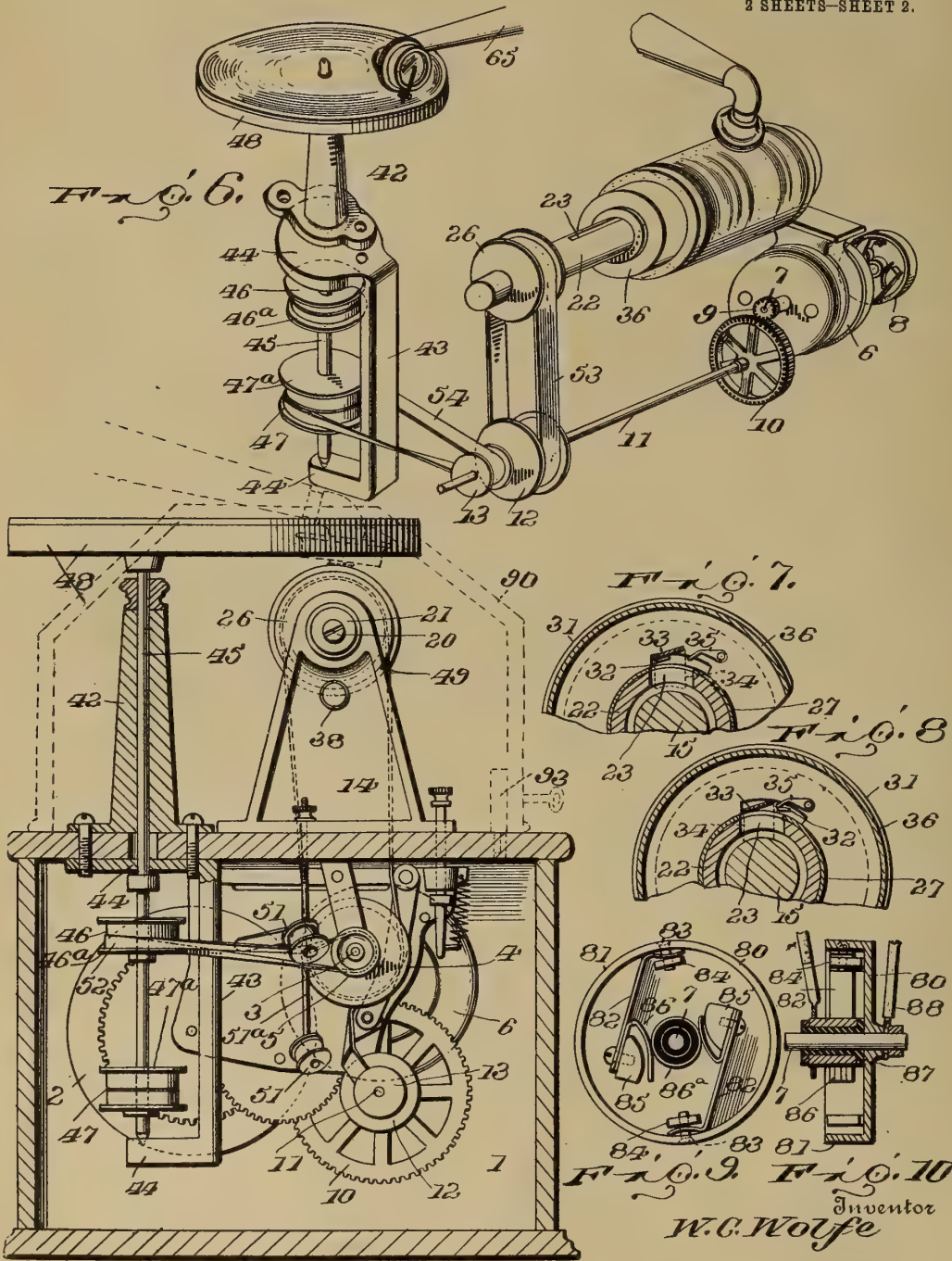


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SOUND REPRODUCING MACHINE.  
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Patented Mar. 9, 1915.

2 SHEETS-SHEET 2.



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# UNITED STATES PATENT OFFICE.

WILLIAM C. WOLFE, OF LILLY, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

1,131,454.

Specification of Letters Patent.

Patented Mar. 9, 1915.

Application filed July 8, 1911. Serial No. 637,575.

*To all whom it may concern:*

Be it known that I, WILLIAM C. WOLFE, a citizen of the United States, residing at Lilly, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in sound reproducing machines.

The object of my present improvements is to provide a simple and economical arrangement of parts for using either disk or cylindrical records.

A further object of the invention is to provide special means for operating the mandrel, whereby the latter may be revolved to reproduce from standard records, or the lateral transverse movement of said mandrel may be retarded to reproduce records which require a greater number of revolutions per inch of its transverse movement than that required in playing the standard.

The invention also relates to an improved means for supporting one end of the mandrel shaft to relieve the strain, due to the weight of the record when the opposite end of said shaft is released to permit it to revolve, and which may be disengaged from the shaft when it is desired to reproduce from records of unusual length.

The invention also comprehends improvements in the various details of construction and arrangement of parts which will be hereinafter described and particularly pointed out in the claims.

In the drawings: Figure 1 is a vertical longitudinal section of my improved machine. Fig. 2 is a transverse section on the line  $x-x$ , Fig. 1. Fig. 3 is a detail transverse section on the line  $y-y$ , Fig. 1. Fig. 4 is a detail plan view of the free end of the sound conveyer. Fig. 5 is a transverse section on the line 5-5, Fig. 4. Fig. 6 is a detail perspective view of parts of the operating mechanism, the cylinder record mandrel, and the turntable for a disk record. Fig. 7 is a detail section on the line  $a-a$ , Fig. 1, illustrating the nut out of engagement with the

mandrel screw. Fig. 8 is a similar view but illustrating the nut in engagement with the screw to laterally feed the mandrel. Fig. 9 is a detail elevation of an electric governor. Fig. 10 is a transverse section of the same.

The same numerals refer to like parts in all the figures.

1 indicates a casing in which is mounted a spring motor 2, including a power shaft 3, provided with two grooved pulleys 4 and 5. Also supported in the casing is an electric motor 6, including a shaft 7, provided at one end with a governor 8, and at its opposite end with a pinion 9. The pinion 9, meshes with a gear wheel 10, mounted on a counter-shaft 11, which has secured to one end pulleys 12 and 13. On the upper surface of the casing 1, is a standard 14, in which is mounted a longitudinally disposed screw threaded shaft 15. The opposite end of this shaft is ordinarily supported in a standard 16, pivoted to ears on the casing. Depending from one side of the standard 16, is a lug 17, which coöperates with a spring 18, formed with a depression 19, in which the lug seats to hold the standard in vertical position to receive the end of the shaft 15. Fitting in a threaded opening in the end of the shaft 15, mounted in the standard 14, is a screw 20, on which is a threaded nut 21, adapted to move on the screw between the head of the latter, and the face of the standard and rigidly secured to the shaft 15, just inside the standard 14, is a gear wheel 15<sup>a</sup>. The object of this construction is to securely hold the shaft 15, in fixed position with the standard when playing standard records. By turning the nut 21, against the standard it draws the screw threaded shaft 15, and the gear wheel 15<sup>a</sup>, laterally and binds said shaft and gear, and thereby prevents rotation.

Mounted on the screw threaded shaft 15, is a sleeve 22, formed with a longitudinal slot 23, and provided at one end adjacent the gear wheel 15<sup>a</sup>, with a gear wheel 24, of less diameter than the gear wheel 15<sup>a</sup>. The sleeve is also provided with a grooved pulley 26. Slidably and loosely mounted on the sleeve 22, is a mandrel sleeve 27, formed with a flange 28, at one end and threaded at its opposite end, as at 29. Fitting against the flange 28, is a milled collar 30, held in place by a collar 31, rigidly mounted on the mandrel sleeve 27. Projecting from the milled collar 30, is a lug 32, fitting in an opening in the collar 31. This lug is designed to be os-



cillated in the plane of the end of a longitudinally disposed flat spring 33, secured to the mandrel sleeve 27, and has secured to it a depending nut 34, threaded on its under surface to engage the threaded shaft 15. The free end of the flat spring is disposed at an angle to form a cam surface for the lug 32, to engage, whereby to elevate the nut from the threads of the shaft 15. Screwed or otherwise fastened to the inside of the mandrel sleeve 27, is a guide block 27<sup>a</sup>, which fits in the slot 23, to prevent said mandrel sleeve turning on the sleeve 22. When the milled collar 30, is turned to disengage the lug 32, from the flat spring, it is held in position by a spring detent 35, secured on the collar 31.

A mandrel 36, is supported at one end on the collar 31, and at its opposite end it is threaded and engages the threads 29, on the mandrel sleeve 27, as shown in Fig. 1. If however, one of the large concert records is to be reproduced the mandrel 36, is removed, and one of large diameter is substituted, as shown in dotted lines at 37, in Fig. 1. In the standard 14, is a screw 38, on which is eccentrically mounted two pinions 39 and 40, one being larger in diameter than the other, and designed to be brought into meshing relation with the gears 15<sup>a</sup>, and 24, when the screw 38, is turned. On the casing is mounted a vertical standard 42, formed with a central opening, and within said casing is a bracket 43, formed with bearings 44, in alinement with the opening in the standard 42. Mounted in these bearings is a vertical shaft 45 provided with a grooved pulley 46, and a fast pulley 46<sup>a</sup>, substantially in the plane of the spring motor shaft 3, and a grooved pulley 47, fast on the shaft and a loose pulley 47<sup>a</sup>, about in the plane of the power shaft 11, of the electric motor. At the upper end of the vertical shaft is a turn table 48, to receive flat disk records. The vertical shaft 45 and the sleeve 22 may be revolved either by the spring motor, or by the electric motor, at the pleasure of the operator. When operating with the spring motor, a belt 49 passes around the grooved pulley 4, of the spring motor and the grooved pulley 26, on the sleeve 22, which imparts motion to the sleeve 22, and a belt 52, is passed around the grooved pulley 5, on the spring motor and around the pulley 46, on the vertical shaft 45, to revolve the turntable alternately with the sleeve 22; belt tighteners 51, being mounted on the spring motor frame to take up the slack, as shown in Fig. 2. The belt tighteners are each connected with an operating rod 51<sup>a</sup>, so that by moving same up or down the belt may be shifted from the fast and loose pulleys 46 and 46<sup>a</sup> or the fast or loose pulleys 47—47<sup>a</sup>. If, however, it be desired to operate the turntable and the mandrel by means of the electric motor, a belt 53, is passed around

the grooved pulley 12, on the shaft 11, and the pulley 26, to revolve the sleeve 22, and a belt 54, is passed around the grooved pulley 26, to revolve the sleeve 22, and a belt 54, is passed around the grooved pulley 13, on the motor shaft and the grooved pulley 47, on the vertical shaft 45. By this construction it is obvious that either motor is adapted to be used for the operation of the machine, whichever is the most convenient. Furthermore, by reference to the drawings, it will be seen that I dispense entirely with the use of gears for transmitting direct power from the motor to the mandrel and turn table, and employ belts which greatly reduces the noise and avoids confusion of sound in the reproducing of a selection.

On the rear of the casing is adjustably mounted a standard 60, provided with a vertical opening 61, to accommodate a spring 62, and a headed pin or journal 63, supported on said spring. The diameter of the head of the pin 63, approximates the diameter of the opening 61, so that the said pin may be freely rocked in any direction, and at its upper end it engages an opening 64, formed on a lug in the neck of a sound conveyer 65. The free end of the neck 65, fits into an opening 66, in the head 67, of the standard 60. Projecting from diametrically opposed sides of the vertical portion of the sound conveyer are trunnions, 68, which bear against the under side of the head 67, and form a pivot on which the sound conveyer vertically rocks, due to irregularities in a record. Formed in the upper part of the head 67, is an overhanging flange 69, open at its front edge to receive the flanged end 70, of an amplifier 71, the front portion of the flange 70, being engaged by a pin 72, to hold the same in the groove formed under the flange 69, in the head 67. Between the standard 60, and the mandrel 36, and mounted on the top of the casing 1, is a standard 75, provided with an adjusting screw 76, and cooperating with the standard is an extensible arm 77, having a transverse upper end 78, formed with a series of depressions 79 and 80. The lower end of this extensible piece is formed with a slot 81, through which a screw 76, passes, whereby to adjust the height of the level of the grooved piece 78, to form a suitable support for the sound conveyer, as will be presently described.

In operation, assuming what is known as a standard cylindrical record is to be played, the parts will be positioned as shown in Fig. 1. That is, the screw threaded shaft 15, is held in fixed position by adjusting the nut 21, against the surface of the standard 14, and the screw 38, is adjusted to throw the gears 39 and 40, out of engagement with the gears 15<sup>a</sup>, and 24, so that power from either of the motors will be transmitted directly to the sleeve 22, hence as it revolves



it will also revolve the nut 21, on the threads of the shaft 15, and cause the mandrel to be laterally moved under the stylus in the usual manner. Previous to this operation, however, the milled collar 30, is turned so as to remove the lug 32, from the beveled end of the flat spring 33, and under the dent 35, as shown in Fig. 8, whereby the spring 33, will cause the nut to engage the threads. If there should be any irregularity in the threads the resiliency of the flat spring 33, will allow sufficient play to prevent binding of the parts and permit the mechanism to freely move. If the sound box used is one in which a slight oscillating movement is permitted independent of the sound conveyer 65, the extensible piece 77, will be elevated and the sound conveyer will be supported in one of the depressions 79. However, if the sound box has no oscillating movement and the latter must be imparted through the sound conveyer, the extensible piece will be lowered and the construction of the headed pin 63, and the trunnions 68, will allow of all necessary rocking motion to permit the stylus to be free to be moved in any direction in traversing the record grooves. In this connection, it may be stated that if it be desired at any time to elevate the stylus from the record grooves when the machine is not in use, the sound conveyer is supported in the depressions 80, which are a trifle higher than the depressions 79. If a record having a greater number of grooves per inch is to be reproduced, the mandrel must be revolved at the same speed, but its lateral movement will be retarded. To accomplish this result, the screw 38, is turned, which because of the eccentric mounting of the gears 38 and 40, will move the latter slightly toward the standard 14, and at the same time elevate them and thereby bring them into mesh with the gears 15<sup>a</sup>, and 24. When it is desired to perform this operation, the nut 21, is released to free the screw threaded shaft 15, to permit it to turn when the gears are in mesh, and the motor is started. The gears are relatively proportioned, so that the speed of the mandrel will at all times be the same, and when the screw shaft is revolved it retards the movement of the nut 21, so that it travels about half the distance traveled when the screw shaft is stationary. Hence simple and effective means are provided to play what is known as either a two or four minute record. If it be desired to use a very long record the hinged standard 16, is thrown down that the end of the record may overhang the end of the mandrel.

The sound conveyer is so constructed that it will accommodate a reproducer to be used with a flat disk record or a reproducer to be used with a cylindrical record. When playing a disk record, the sound conveyer is

swung around over the turntable, and the motor is started in the usual manner.

When using the electric motor, it is of the utmost importance that the speed be controlled, and I therefore provide a special construction for this purpose. The governor comprises a disk 80, secured on the shaft 7, and provided with an annular flange 81. Secured on the inside of the flange 81, are two flexible angular levers 82. Each lever 82, is of angular formation and the bent end thereof is in the form of an O—G curve, and a screw 83, passes through the bent end and a nut 84, clamps the underside of the bent portion, said nut bearing against the disk to prevent it turning. The inner end of each lever is provided with a weight 85, and a spring contact finger 86. The spring contacts are designed to engage with a sleeve 86<sup>a</sup>, on the shaft 7, said sleeve being insulated from the shaft as shown at 87. One of the wires to conduct the current to the motor is connected to the sleeve 86<sup>a</sup>, and the current passes through the disk from a wire 88, secured to the end of the shaft 7. When the speed of the motor exceeds the determinate number of revolutions, the weighted levers 85, are centrifugally thrown outwardly, and the spring contact fingers are disengaged from the sleeve 86<sup>a</sup>, and thereby breaks the circuit. Obviously this construction will govern the speed of the motor and maintain uniformity in the operation of the machine.

What I claim is:

1. In a sound reproducing machine, the combination of a motor, a threaded shaft, a mandrel support mounted over the threaded shaft, a mandrel on the mandrel support, a threaded adjustable nut between the threaded shaft and the mandrel whereby to cause the latter to move laterally, a connection between the motor and the mandrel support, gears on the threaded shaft and the mandrel support, shiftable gears for engaging the gears on the mandrel support and the threaded shaft, and means for holding the threaded shaft stationary when the shiftable gears are out of engagement with the gears on the threaded shaft and the mandrel support whereby when said gears are in mesh the threaded shaft and the mandrel support will be simultaneously rotated and the threaded shaft will retard the lateral movement of the mandrel and when said gears are out of mesh the mandrel support will be rotated alone.

2. In a sound reproducing machine, the combination of a motor, a threaded shaft, a mandrel support, a mandrel on the mandrel support, a connection between the motor and the mandrel support, gears on the threaded shaft and the mandrel support, shiftable gears for engaging the gears on the threaded shaft and the mandrel sup-

port, and a locking device for holding the threaded shaft in fixed position when the shiftable gears are out of engagement with the gears on the threaded shaft and the mandrel support.

3. In a sound reproducing machine, the combination of a motor, a screw threaded shaft, a mandrel support mounted on said screw threaded shaft, a mandrel on the mandrel support, a connection between the mandrel support and the motor to directly drive the mandrel, a shiftable nut between the mandrel and the threaded shaft, gears on the threaded shaft and the mandrel support, and shiftable gearing adapted to be brought into engagement with the gears on the threaded shaft and the mandrel support for retarding the lateral movement of the mandrel.

4. In a sound reproducing machine, the combination of a screw threaded shaft, a mandrel support, a mandrel mounted thereon, means for revolving the mandrel support alone, shiftable means for simultaneously revolving the threaded shaft with the mandrel support, and a nut interposed between the threaded shaft and the mandrel whereby the mandrel will move laterally at a given speed when the mandrel support is rotated alone and said mandrel will move laterally at a less speed than the aforesaid given speed when the mandrel support and screw shaft rotate together.

5. In a sound reproducing machine, the combination of a revolving mandrel support, a mandrel mounted thereon, a screw threaded shaft, means between the screw threaded shaft and the mandrel to cause the latter to travel laterally on the support, and means for revolving the screw threaded shaft to retard the lateral movement of the mandrel and maintain the revolving speed of said mandrel, and means for revolving the mandrel support.

6. In a sound reproducing machine, the combination of a threaded shaft, adjustable means adapted to hold the threaded shaft stationary, a gear on the threaded shaft, a mandrel support including a slotted sleeve, a gear on the slotted sleeve, a mandrel on the mandrel support, a removable nut fitting in the slot and carried by the mandrel

and engaging the threaded shaft, means for rotating the mandrel support, and shiftable gears adapted to mesh with the gears on the threaded shaft and the mandrel support, whereby when the adjustable holding means is released and the gears are in mesh the mandrel will be moved laterally at one speed and when the threaded shaft is held stationary and the shiftable gears are out of mesh the mandrel will be moved at a different speed.

7. In a sound reproducing machine, the combination with a threaded shaft, a support for the shaft, a threaded element extending from the end of the threaded shaft, a nut engaging the threaded element to bind and hold the threaded shaft stationary in its support, a gear on the threaded shaft, a mandrel support including a slotted sleeve surrounding the threaded shaft, a mandrel mounted on the sleeve, a gear on the sleeve, a spring actuated nut connected to the mandrel and engaging in the slot and the threaded shaft, means for holding the nut out of engagement with the threaded shaft, means for rotating the sleeve, and two gears mounted eccentrically and adapted to be engaged with the aforesaid gears when the first mentioned nut is disengaged to change the speed of the lateral movement of the mandrel.

8. In a sound reproducing machine, the combination of a threaded shaft, a mandrel support surrounding the threaded shaft, a mandrel mounted on the mandrel support, means for rotating the mandrel support, and means including gears and an adjustable device for rotating the threaded shaft simultaneously with the mandrel support to move the mandrel laterally at a determinate speed or holding the threaded shaft stationary and rotating the mandrel support alone to change the speed of the lateral movement of the mandrel.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM C. WOLFE.

Witnesses:

W. N. WOODSON,  
JNO. IMIRIE.



PHONOGRAPH RECORDER,  
# 1,131,782-----N. H. Holland,  
Patented-March 16, 1915.  
Filed-December 19, 1910.

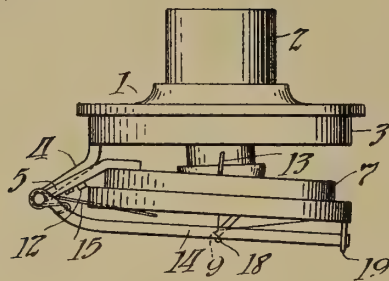


N. H. HOLLAND.  
 PHONOGRAPH RECORDER.  
 APPLICATION FILED DEC. 19, 1910.

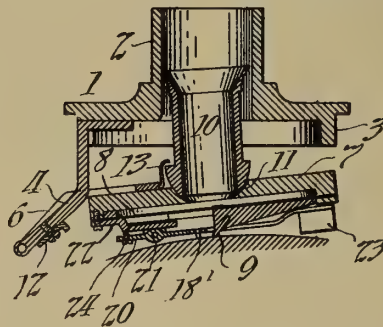
1,131,782.

Patented Mar. 16, 1915.

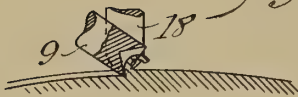
*Fig. 1*



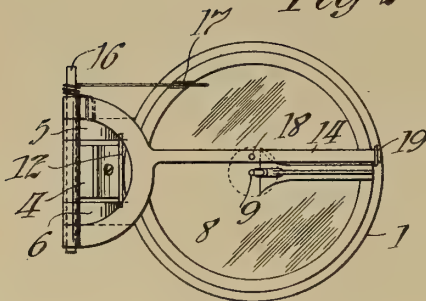
*Fig. 4*



*Fig. 3*



*Fig. 2*



*Witnesses:*

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 Dyer Smith

*Inventor:*

Newton H. Holland,  
 by Frank L. Dyer  
 His Atty.

# UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-RECORDER.

1,131,782.

Specification of Letters Patent.

Patented Mar. 16, 1915.

Application filed December 19, 1910. Serial No. 598,069.

*To all whom it may concern:*

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, residing at Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Recorders, of which the following is a description.

My invention relates to improvements in phonograph recorders and more particularly to a device in which the compensating weight supporting the diaphragm is made of considerable mass, or to have considerable inertia, so that imperfections in the record due to vibrations of the diaphragm support are reduced to such a degree as to be unobjectionable, and in which a tracker or "ball advance," adapted to bear on the surface to be recorded upon, is employed, means being provided for automatically adjusting the relative positions of the tracker and the recording stylus when the latter engages a moving record surface, whereby the depth of the initial cut of the stylus is controlled. The initial cut is that cut which is taken by the stylus before the sound vibrations to be recorded are caused to impinge upon the diaphragm. This cut is necessary to permit the proper recording of sound rarefactions, which cause an upward movement of the stylus, and should be of a fixed and predetermined depth for the most efficient operation of the recorder.

Because of variations in the set of the diaphragm under different weather conditions and also because of slight changes in the angular relation of the recorder and the surface upon which the record is to be made, the depth of the initial cut taken by the stylus will not be uniform unless some means for adjusting the relative positions of the stylus and the tracker with relation to the surface of the record blank is provided. In devices heretofore used, this adjustment has been provided for by mounting the tracker in a support adjustable by means of a set screw. This adjustment being very small in amount, has been performed by the use of micrometers or other such instruments of precision with the result that the recorders thus constructed have not been adapted for use by the general public. For the recorders of business phonographs, and other phonographs for general use, it has therefore been

found impracticable to use a tracker; and the size of the compensating weight has, therefore, been so reduced in these instruments that an objectionable blasting and other undesirable effects due to the springing of said weight from the record surface have been unavoidable, these effects being, in such recorders, particularly marked when the stylus first starts cutting and when the machine is stopped.

It is the object of my invention to improve the construction of the recorders of business phonographs and other phonographs specially adapted for general use; and I accomplish this result by providing the same with a tracker which, when placed on the surface on which the record is to be made, automatically regulates the depth of the initial cut of the stylus thereby making it possible to use a compensating weight of considerable size on such phonographs.

In order that the invention may be better understood, attention is directed to the accompanying drawings forming a part of this specification, and in which—

Figure 1 is a side elevation of a recorder embodying one form of my invention; Fig. 2 is a bottom plan view thereof; Fig. 3 is a detail view taken from the side of the recorder opposite to that shown in Fig. 1 and showing the stylus cutting a record blank; and Fig. 4 is a central, vertical, sectional view of a recorder showing the preferred form of my invention.

In all of the views like parts are designated by the same reference numerals.

The body 1 is of the usual form, being provided with the usual neck or bore 2 and the depending annulus or flange 3. Pivoted to the arm 4 depending from the body 1 are two lugs 5 and 6 carrying a compensating weight 7 constituting a casing for the diaphragm 8 carrying the stylus 9. A weighted tube 10 is preferably employed, and rests at its lower end on the casing 7 to form a ball and socket joint 11 and at the upper end engages the bore 2; so that the tube is capable of vertical movement with respect to the body 1 and together with the member 7 exerts a downward pressure on the stylus. The casing 7 and tube 10 are preferably made of considerable weight so as to eliminate objectionable vibration thereof when the stylus is encountering the resistance of the



material being cut. A stop 12 secured to the arm 4 presents excessive downward movement of the compensating weight; and a lip 13 secured to the member 7 prevents accidental displacement of the tube 10.

Referring to Figs. 1 and 2, the form of my invention disclosed therein comprises a pivoted arm or lever 14 having secured thereto a spring 15 preferably mounted on the member 16 which latter constitutes a pivot for the lugs 5 and 6 and the arm 14. This spring also engages within a groove 17 on the bottom of the member 7; so that when the tracker 18 which is mounted in the arm 14, engages the uncut surface of the record blank adjacent the stylus 9 as shown in Fig. 3, the said spring will press upwardly upon and thus partly counterbalance the compensating weight and together with the tracker 18 and the arm 14 will regulate the depth of the initial cut taken by the stylus. The tracker or ball advance 18 is preferably a rounded ball of sapphire or other suitable material.

In Fig. 3 are shown the relative positions of the tracker and stylus when the initial cut is being taken. A loop 19 secured to the member 7 is located adjacent the outer extremity of the arm 14 and limits the downward movement thereof.

In the preferred form of my invention, which is shown in Fig. 4, the tracker 18' is carried by a lever 20 pivoted intermediate its ends as at 21 to a lip 22 or other similar support secured to the casing 7. The arm of this lever which carries the tracker 18' is weighted as at 23 at a position more remote from the pivot 21 than the tracker 18' so that the lever 20 tends to turn about the tracker 18' as a fulcrum when the latter is placed on the record blank and thus to exert an upward pressure on the compensating weight at the pivot 21. The diaphragm and the stylus carried thereby are thus held in proper relation with reference to the said blank for an initial cut. A screw 24 mounted in the lever 20 engages the lip 22 or any other suitable part to regulate the position of the tracker with relation to the stylus when the latter is not in engagement with the record surface.

It is evident that by merely placing my improved recorder in contact with the surface upon which the record is to be made, the stylus will always automatically sink to a proper and uniform depth and that my recorder is therefore of great utility for business phonographs and other phonographs intended for general use.

While I have shown several means for carrying my invention into effect, I do not wish to be understood as confining myself to these means; as my invention is limited only as defined by the terms of the appended claims.

Having now described my invention, what I claim and desire to secure by Letters Patent is:

1. In a device of the class described, the combination with a vibratory stylus, and pressure means tending to force said stylus to cut into a record blank when said stylus engages the blank, of counterbalancing means for said pressure means comprising pivoted tracking means adapted to engage the blank, and means automatically exerting a force tending to move said pressure means away from said tracking means, substantially as described.

2. In a device of the class described, the combination with a vibratory stylus, and pivoted pressure means tending to force said stylus to cut into a record blank when said stylus engages the blank, of counterbalancing means for said pressure means comprising tracking means adapted to engage the blank, and means automatically exerting a force tending to move said pressure means away from said tracking means, substantially as described.

3. In a device of the class described, the combination with a vibratory stylus, and gravity means tending to force said stylus to cut into a record blank when said stylus engages the blank, of counterbalancing means for said gravity means comprising pivoted tracking means adapted to engage the blank, and means automatically exerting a force tending to move said gravity means away from said tracking means, substantially as described.

4. In a device of the class described, the combination with a vibratory member, a stylus connected thereto, and gravity means supporting said vibratory member and tending to force said stylus to cut into a record blank when said stylus engages the blank, of counterbalancing means for said gravity means comprising pivoted tracking means adapted to engage the blank, and means automatically exerting a force tending to move said gravity means away from said tracking means, substantially as described.

5. In a device of the class described, the combination with a vibratory stylus, and pressure means tending to force said stylus to cut into a record blank when said stylus engages the blank, of counterbalancing means for said pressure means comprising tracking means adapted to engage the blank, and gravity means automatically exerting a force tending to move said pressure means away from said tracking means, substantially as described.

6. In a device of the class described, the combination with a vibratory stylus, and pressure means tending to force said stylus to cut into a record blank when said stylus engages the blank, of counterbalancing means for said pressure means comprising



a pivoted tracker adapted to engage the blank, and gravity means coacting with said tracker and automatically exerting a force tending to move said pressure means away  
5 from said tracker, substantially as described.

7. In a phonograph recorder, the combination with a body, a vibratory member, a recording stylus connected with said vibratory member, and means connected with said  
10 body for supporting said vibratory member, of an arm pivoted to said means, and a tracker secured to said arm, said arm being weighted on the same side of its pivot as  
15 said tracker and at a position more remote from said pivot than said tracker, substantially as described.

8. In a phonograph, the combination with a body, a compensating weight, a vibratory member carried by said compensating weight and a recording stylus connected to said  
20 vibratory member, of a pivoted arm mounted on said compensating weight, and a tracker secured to said arm, said arm being weighted  
25 on the same side of its pivot as said tracker and at a position more remote from said pivot than said tracker, substantially as described.

9. In a phonograph, the combination with  
30 a body, a compensating weight, a vibratory member carried by said compensating weight and a recording stylus connected to said vibratory member, of a lever having a weight and a tracker secured thereto on one side  
35 and a limiting stop adjustably mounted therein on the other side of its pivot, substantially as described.

10. In a phonograph recorder, the combination with a body, a compensating weight,  
40 a diaphragm carried by said compensating weight, and a recording stylus connected with said diaphragm, of a lever having a weight adjacent one extremity, means for pivotally securing said lever to said compensating weight, a tracker attached to said  
45 lever intermediate its weight and pivot and adapted to bear upon the surface to be recorded upon and a set screw mounted in said lever and adapted to bear on said means to  
50 act as a limiting stop for said lever, substantially as described.

11. In a phonograph recorder, the combination with a diaphragm, a stylus connected thereto, and gravity means tending to force  
55 said stylus to cut into a record blank when said stylus engages the blank, of means arranged to engage the blank and counterbalance the gravity means to automatically cause the stylus to take an initial cut of a

fixed amount regardless of variations in the  
60 set of the diaphragm, substantially as described.

12. In a phonograph recorder, the combination with a diaphragm, a stylus connected thereto, and gravity means supporting said  
65 diaphragm and tending to force said stylus to cut into a record blank when said stylus engages the blank, of means arranged to engage the blank and counterbalance the gravity means to automatically cause the  
70 stylus to take an initial cut of a fixed amount regardless of variations in the set of the diaphragm, substantially as described.

13. In a phonograph recorder, the combination with a diaphragm, a stylus connected  
75 thereto, and pivoted gravity means tending to force said stylus to cut into a record blank when said stylus engages the blank, of means arranged to engage the blank and counterbalance the gravity means to automatically  
80 cause the stylus to take an initial cut of a fixed amount regardless of variations in the set of the diaphragm, substantially as described.

14. In a phonograph recorder, the combination with a diaphragm, a stylus connected  
85 thereto, and means tending to force said stylus to cut into a record blank when said stylus engages the blank, of a tracker arranged to engage the surface of the blank  
90 and free to automatically move relatively to said stylus when the recorder is placed in engagement with the blank, and means coacting with said tracker to control the depth of the initial cut of said stylus, said last  
95 named means being weighted to partly counterbalance said first named means, substantially as described.

15. In a phonograph recorder, the combination with a diaphragm, a stylus connected  
100 thereto, and means tending to force said stylus to cut into a record blank when said stylus engages the blank, of a tracker arranged to engage the surface of the blank and free to automatically move relatively  
105 to said stylus when the recorder is placed in engagement with the blank, and pivoted means coacting with said tracker to control the depth of the initial cut of said stylus, said last named means being weighted to  
110 partly counterbalance said first named means, substantially as described.

This specification signed and witnessed  
this 17th day of December 1910.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.



PHONOGRAPH PATENT.

MANUALLY CONTROLLED PHONOGRAPHIC MECHANISM,

# 1,132,092 ----- P. Hesselius,

Patented-March 16, 1915.

Filed-February 21, 1914.



P. HESSELIUS.

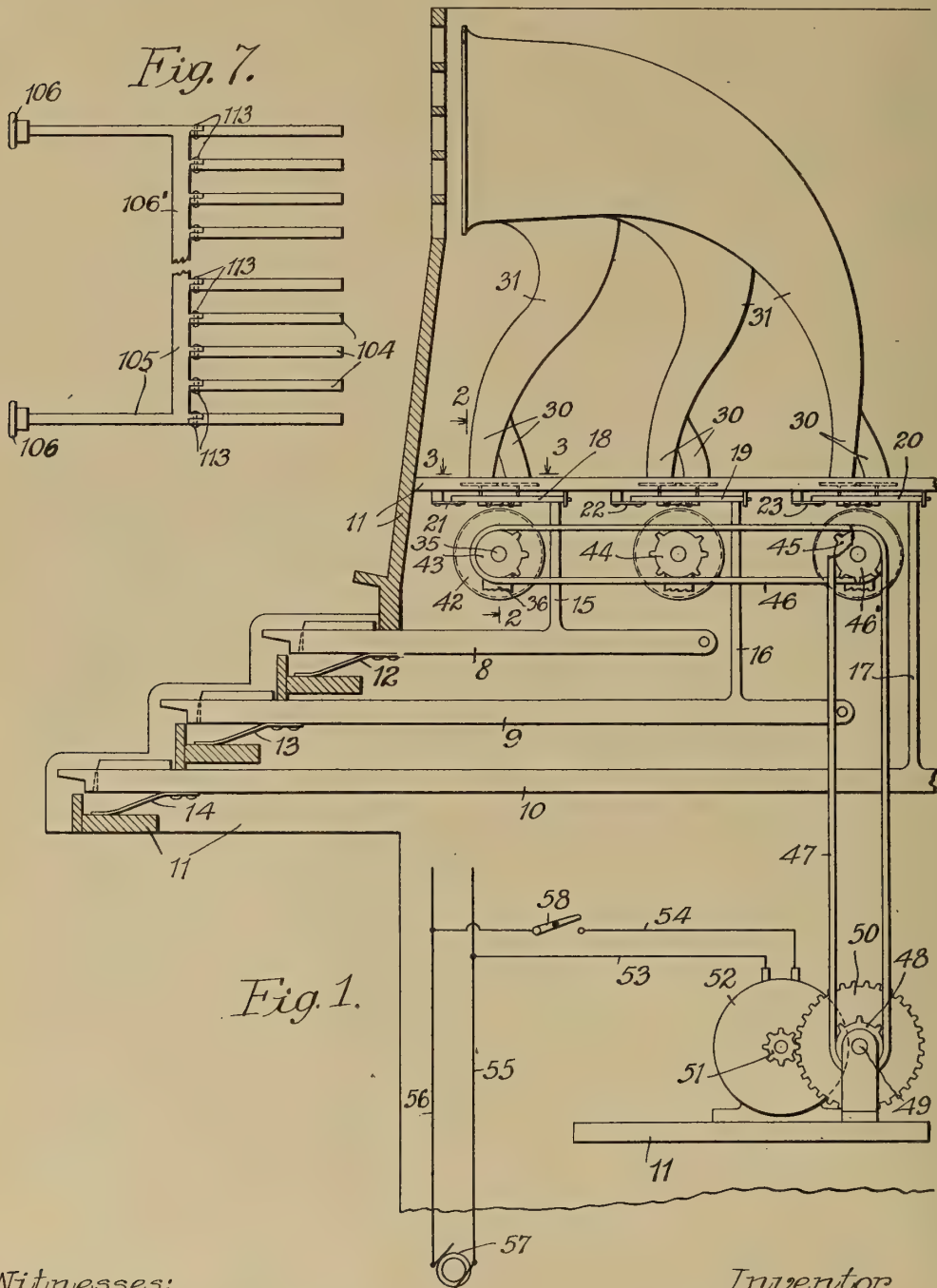
MANUALLY CONTROLLED PHONOGRAPHIC MECHANISM.

APPLICATION FILED FEB. 21, 1914.

1,132,092.

Patented Mar. 16, 1915.

4 SHEETS—SHEET 1.



Witnesses:  
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MANUALLY CONTROLLED PHONOGRAPHIC MECHANISM.  
APPLICATION FILED FEB. 21, 1914.

1,132,092.

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4 SHEETS—SHEET 2.

Fig. 4.

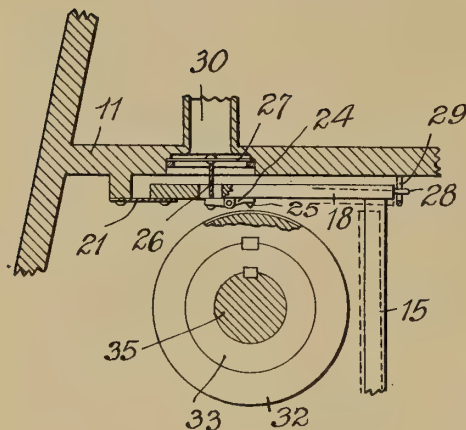


Fig. 3.

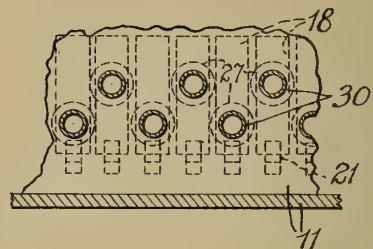
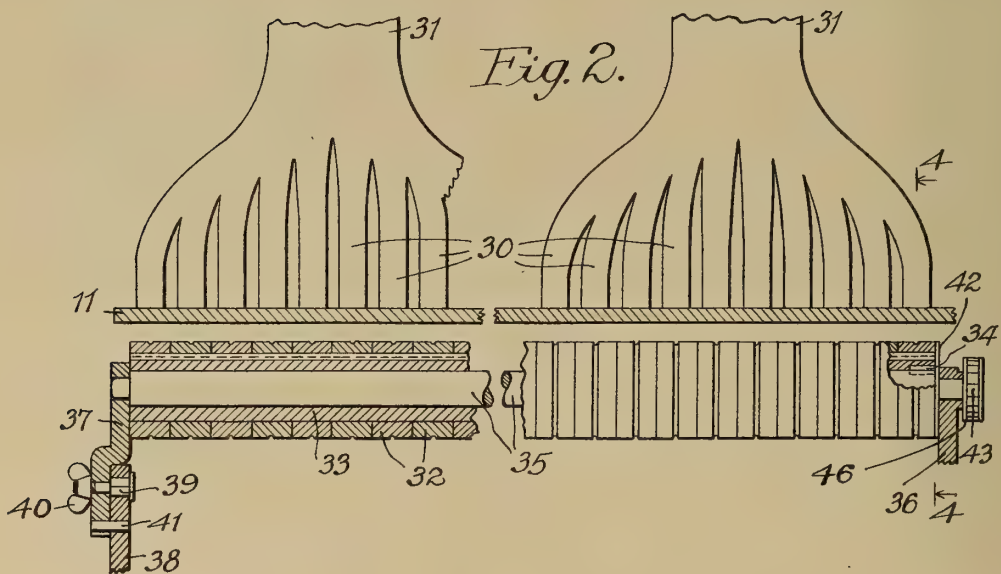


Fig. 2.



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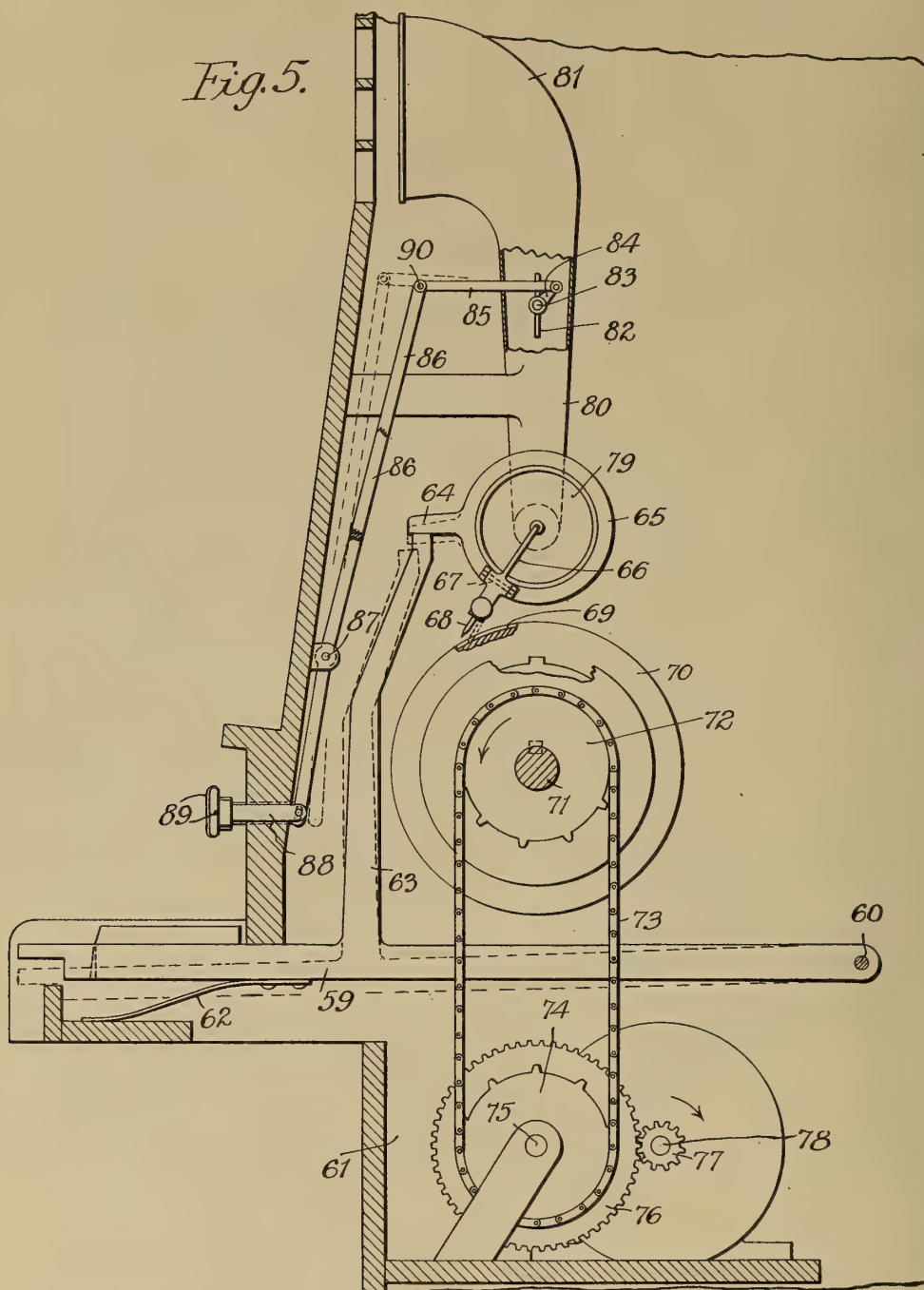
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### MANUALLY CONTROLLED PHONOGRAPHIC MECHANISM.

APPLICATION FILED FEB. 21, 1914.

Patented Mar. 16, 1915.

4 SHEETS—SHEET 3.



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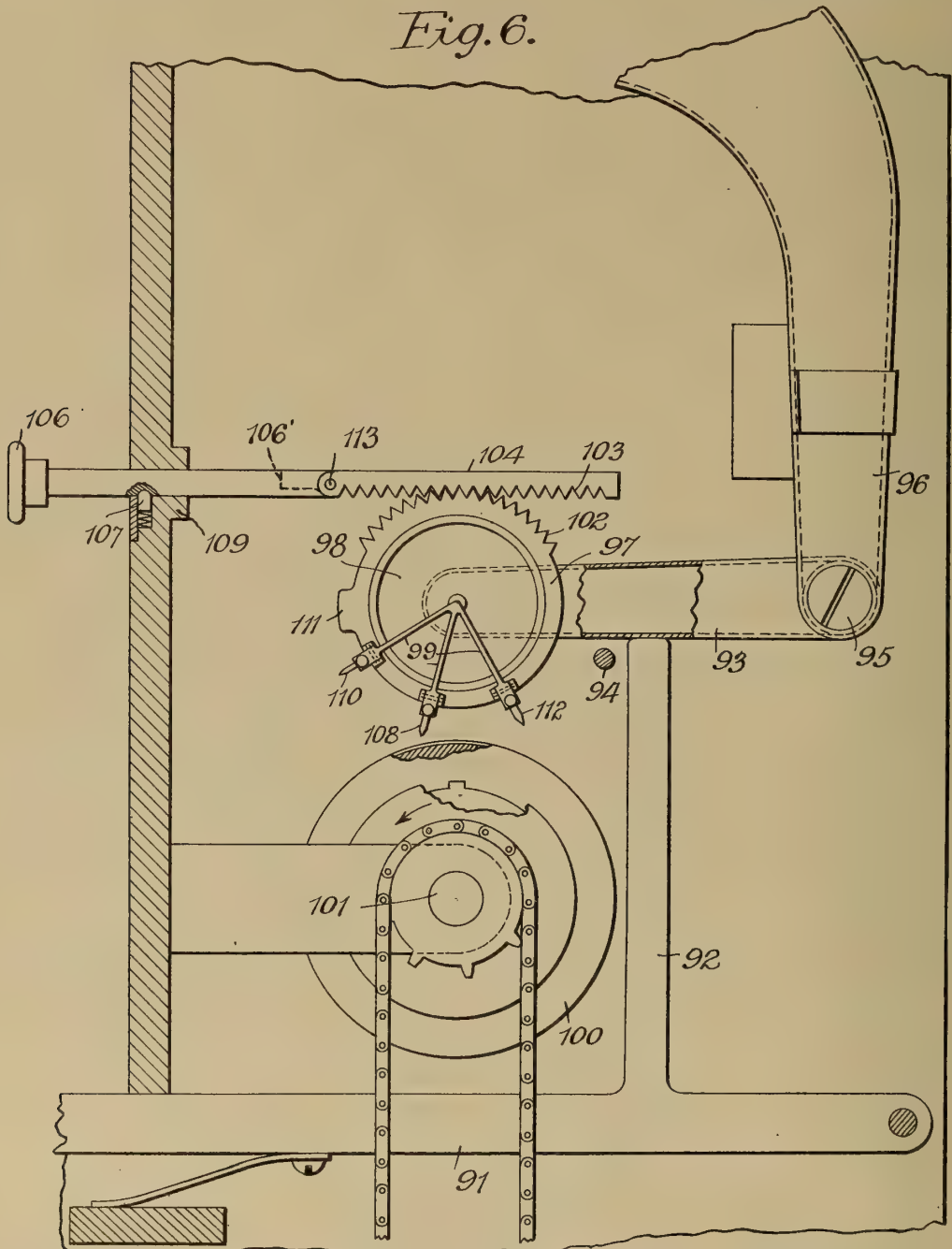
P. HESSELIUS.  
MANUALLY CONTROLLED PHONOGRAPHIC MECHANISM.  
APPLICATION FILED FEB. 21, 1914.

1,132,092.

Patented Mar. 16, 1915.

4 SHEETS-SHEET 4.

Fig. 6.



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# UNITED STATES PATENT OFFICE.

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## MANUALLY-CONTROLLED PHONOGRAPHIC MECHANISM.

1,132,092.

Specification of Letters Patent.

Patented Mar. 16, 1915.

Application filed February 21, 1914. Serial No. 820,158.

*To all whom it may concern:*

Be it known that I, PETER HESSELIUS, residing at Chicago, in the county of Cook and State of Illinois, have invented certain  
5 new and useful Improvements in Manually-Controlled Phonographic Mechanism, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a  
10 part of this specification.

My invention relates to musical instruments incorporating phonographic mechanism and has for its object certain new improvements to be presently set forth.

15 My invention may be applied to pianos or organs either manually played or mechanically played.

The underlying idea of my invention may readily be explained in connection with a  
20 pipe organ. Such an organ is provided with one or more manual key-boards in which the several keys denote the several tones and intervals of the diatonic musical scale. The organ is provided also with a number of  
25 stops, the operation of any one of which will connect its own set of reeds or pipes with the key-board, so that the manipulation of the keys will control the supply of air to the pipes or reeds of the organ which  
30 may be connected with the keys by means of the stops.

There are certain limitations as to the variety of tones or tone qualities which can be secured from the reeds, pipes, bells, etc.,  
35 with which an organ may be equipped and consequently there are limitations upon the tone quality which it is possible to secure in a pipe organ. While for example, it may be an easy matter to construct a set of reeds  
40 to simulate the tone quality of a clarinet or flute, it is difficult if not impossible, to construct a set of reeds or pipes which will closely simulate the tone quality of a violin or cornet.

45 In accordance with my invention, I may equip an organ with phonographic apparatus for reproducing any desired note of any desired tone quality. The organ is equipped with phonographic apparatus which may be  
50 placed under the control of the manual key which represents middle C, whereby the depression of the key will cause the phonographic apparatus to produce a tone having the pitch of middle C, the phonographic apparatus acting to produce the requisite tone

as long as the key may be depressed. The organ is equipped with another phonographic record which when reproduced will sound a tone having the pitch of the musical note D. Other phonographic apparatuses  
60 will produce the other tones of a complete diatonic scale, the phonographic reproduction of each note being under the control of the manual key assigned to each such tone or pitch.

65 If one set of phonographic records is made by recording the notes of the diatonic scale, as produced upon a violin, then the phonographic mechanism may be made to sound notes or tones having the violin quality, but  
70 under the control of the manual keys of the organ. By means of this arrangement it is possible for an organist to play a piece of music in the usual way by manipulation of the organ keys, the music being produced  
75 with the tone quality of a violin, the succession and duration of notes being controlled at will by the organist in accordance with his manipulation of the organ keys.

The organ may be equipped not only with  
80 phonographic apparatus containing records of the different notes as produced upon a violin, but it may be equipped also with a diatonic scale of phonographic tones, as produced by a cornet, a bassoon, a trumpet,  
85 etc. The phonographic reproductions of the tones recorded upon the phonographic records simulate very closely the tone qualities of the original sounds used in making the phonographic records. As a result, there-  
90 fore, it is possible to equip an organ with phonographic records which will enable an organist, by manipulating the stops which control the connection between the keys and the several sets of phonographic records, to  
95 reproduce orchestral music with surprising fidelity.

The tone quality of the sounds recorded upon the phonographic records is not limited to the tone qualities of the usual orchestral instruments. For example, the organ  
100 may be equipped with a set of phonographic apparatus in which the phonographic record of each note is produced by a human voice or by human voices. Thus a soprano voice  
105 can sing a continuous vowel sound, for example "ah" with the pitch of each of the notes of the diatonic scale within the range of the soprano voice. An alto or contralto voice may sing the notes of the diatonic scale  
110



next lower in register, a tenor voice may sing the next lower notes and a bass voice may sing the lowest notes of the set. There may be produced in this way a phonographic voice record of each of the notes of a diatonic scale, each of the notes or tones having the quality of the voice or voices when singing the vowel sound "ah". When this set of phonographic records, together with the appropriate reproducers is put under the control of the manual keys, by means of a suitable stop, then the manipulation of the organ keys will cause the organ to "sing" in conformity with the organist's manipulation of the keys. The music thus produced in the operation of the phonographic reproducing apparatus may be used alone or in conjunction with music produced by the ordinary pipes and reeds of organs heretofore constructed.

My invention may be embodied in pianos as well as in organs, and the tone producing mechanism whether incorporated in a piano or in an organ, or in a wholly distinct and separate musical instrument of a new class, may be operated by perforated music rolls and pneumatic or electrical actuating mechanism, which may be substantially identical with that with which pianos and organs of the prior art have been automatically "played."

A pipe organ embodying my invention does not differ essentially from pipe organs of the prior art, except as to the mechanism involving the phonographic reproduction of sounds. I have not thought it necessary or desirable therefore to illustrate the old and well known features of pipe organ constructions in illustrating my invention. I have, however, prepared the accompanying drawings in which—

Figure 1 is a view showing more or less diagrammatically one arrangement of the phonographic reproducing mechanism, in which I have employed three sets of keys in conjunction with a like number of cylinders, which cooperate with reproducing needles which produce sounds or notes of different tone qualities. Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1, some of the parts being removed for the sake of clearness; this view showing particularly the arrangement of the phonographic record cylinders upon which the tones of the diatonic scale are recorded, and also the device through which the sounds are conveyed to the horns. Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 1. Fig. 4 is an enlarged cross-sectional view taken on line 4—4 of Fig. 2. Fig. 5 is a view of a modified arrangement wherein a different set of sound boxes is employed in connection with a rotating cylinder upon which the musical tones or notes have been recorded. Fig. 6 is another modification, illustrating more or less

diagrammatically an arrangement whereby three different volumes or tone qualities are secured by means of three different needles on each sound box. Fig. 7 is a top view of the mechanism for adjusting the sound boxes employed in the modification illustrated in Fig. 6.

Referring now to Figs. 1 to 4 inclusive, I have shown three banks of keys 8, 9 and 10, which are pivoted to the frame 11 of the instrument. These keys conform with the arrangement of keys as heretofore embodied in pianos and organs. Each key is held in its normal position by means of a spring as indicated at 12, 13 and 14. Each of the keys is provided with an upwardly extending arm as shown at 15, 16 and 17, these arms cooperating with the sound box levers 18, 19 and 20, each associated with a phonographic sound box of any appropriate type. The sound box levers are secured to the frame 11 by means of springs 21, 22 and 23, the arrangement being such that the sound box levers may be moved up and down in conformity with the depression and spring controlled elevation of the keys, 8, 9 and 10. As illustrated more particularly in Fig. 4, each sound box lever, as for example 18, has pivoted thereto a stylus lever 24, which carries at one end a pointed stylus 25, and the other end of which has secured thereto a wire or rod 26, or other suitable connection with the diaphragm 27 of the sound box. The outer end of the sound box lever 18 is provided with a tongue 28, which projects through a U-shaped stirrup 29 extending downward from the frame 11, this U-shaped stirrup member being provided for the purpose of limiting the downward movement of the sound box lever 18. The sound box has secured thereto, the tone arm 30 which leads to a horn as indicated at 31 in Fig. 1. As indicated in Figs. 2 and 3, there is a tone arm leading from each sound box, so that when any one of the stylus points 25 is in engagement with its associated cylinder 32, the sound produced will be carried through the associated tone arm to the horn. The weight of the sound box levers 18, 19 and 20 maintains the reproducing stylus points in proper engagement with the record grooves in the peripheries of the phonographic cylinders 32.

The cylinders 32 of any composition suitable for phonographic reproduction, are splined upon a sleeve 33 as shown in Fig. 2, this sleeve being keyed at 34 to the shaft 35, which is supported at one end in a fixed bearing 36, and at the other end in a removable bearing 37. The removable bearing 37 is held upon a support 38, by means of a bolt 39, tightened in place by means of a fly nut 40, and in addition to which there is a pin 41 cooperating with the removable bearing 37 to fix the bearing firmly in position.



The right-hand end of the shaft 35 is provided with a thin flange 42, which serves to take the end thrust of the sleeve 33 and the cylinders 32.

Each of the cylinders 32 is provided as shown with a phonographic record groove. One of the phonographic grooves is adapted when its cylinder is operated at normal speed to produce the note C. The next adjacent cylinder is provided with a record groove which when operated at the same speed will produce the note C sharp, the next cylinder is provided with a groove which will produce the note D, the next one which will produce the note D sharp, the next with a groove which will produce the note E and so on. The tone quality of the notes produced by the phonographic record grooves will depend of course upon the tone quality of the sounds which have been employed in making the phonographic records. If the grooves have recorded the notes as played on a violin, the sounds reproduced will have a violin tone quality. If the phonographic record grooves have been produced by the sounds of a human voice, the reproductions will have a corresponding tone quality. In any event, the grooves of the record cylinders when run at the proper speed, will produce the several tones or notes of the diatonic scale.

When the instrument is played, the phonographic record cylinders are rotated at constant speed by means of the sprocket wheels 43, 44 and 45, connected by means of the sprocket chains 46 and 47 with a sprocket wheel 48, mounted upon a shaft 49, which shaft carries a gear 50 in mesh with a pinion 51 carried upon the shaft of the motor 52. While I have indicated an electrical motor connected by means of the wires 53 and 54 to line wires 55 and 56, and thus with a source of power 57, and with a switch 58 to control the flow of current, it will be understood that this representation of motor mechanism is purely diagrammatical, and that any suitable motor mechanism operated or governed to run at constant speed may be employed to drive the phonographic cylinders, the several phonographic cylinders being in constant rotation at the proper speed. The depression of any one of the keys 8, 9 or 10 will effect an engagement of the stylus needle of the associated sound box with its cooperating phonographic cylinder, to cause the production of a tone dependent in quality and pitch upon a record graved upon the periphery of the cylinder. This arrangement puts it within the power of the operator to play any desired selection by manipulation of the manual keys which control the phonographic production of tones conforming in pitch with the position of the keys in the key-board. In Fig. 1, I have illustrated three sets of cylindrical records.

The three sets of cylinders may be regarded as equipped with grooves adapted to produce notes of different tone qualities, or they may be regarded as graved to produce tones having the same quality but different degrees of loudness.

I have not illustrated the usual organ stop mechanism by means of which the phonographic reproducers may be connected or disconnected at will from the control of the manual keys, but the inter-position of such mechanism is well understood in the organ building art, and it would add nothing to the disclosure of my invention, to illustrate this somewhat complicated mechanism.

When it is desired to replace any one of the cylinders 32, as for example when it becomes worn, the removable bearing 37 is withdrawn from the supporting member 38, and the sleeve 33 is removed from the shaft 35 whereupon any one of the cylinders 32 may be replaced.

Referring now to Fig. 5, I have shown a modified arrangement wherein the several keys 59 are pivoted to a rod 60, suitably supported by the frame 61, the springs 62 serving to maintain the keys in their normal elevated positions. Each of the keys is provided with an upwardly extended arm 63, each arm cooperating with a stud 64 extending outwardly from a sound box 65. Each sound box is provided with a lever 66, pivoted to the sound box at 67, and carrying a needle 68 which is arranged to be dropped into the record groove 69 of a record cylinder 70, upon the depression of the associated key 59. The cylindrical record shown at 70 is one of a number of records substantially like those shown in Fig. 2, the cylinder 70 being mounted upon a shaft 71 which shaft is provided with a sprocket wheel 72 connected by means of a chain 73 with the sprocket wheel 74 mounted upon a shaft 75, suitably supported from the frame. The shaft 75 is provided with a gear wheel 76, meshing with a pinion 77 carried upon a motor shaft 78. The rotation of the motor when properly governed in the well known manner imparts a uniform rotation to the record cylinders mounted upon the shaft 71. When therefore, any of the keys 59 is depressed, the needle of the associated sound box is dropped into the groove of the associated record cylinder whereupon the diaphragm 79 of the sound box will be caused to vibrate to produce a sound which is carried through the tone arm 80 and the horn 81. The tone arm is supported as shown from the frame 61 and carries the associated sound box upon a pivoted connection which permits the sound box to rotate to bring its needle into engagement with the associated record cylinder. In order to regulate the loudness of the sounds delivered from the



phonographic reproducing mechanism, I have illustrated a sound damper 82 which is carried by the pin 83 just at the junction of the tone arms and the horn 81. An arm 84 secured to the pin 83 carries a rod 85, pivoted to a lever 86 which in turn is pivoted to the frame at 87, and it is connected at the far end to a push rod 88 upon the front end of which may be mounted a button 89. This mechanism provides means whereby the operator may regulate the position of the damper to control the loudness of the sound delivered through the horn. It is only necessary to have one damper for each horn inasmuch as there are several tone arms connected to each horn. If only two horns are employed it is necessary to employ but two levers 86, which levers may be rotated to different positions by means of the buttons 89.

Referring now to Figs. 6 and 7, I have shown in diagrammatic fashion an arrangement in which each of the keys 91 is provided with an arm 92 upon which rests the tone arm 93 of a phonographic reproducer. The downward movement of the tone arms in this arrangement is limited by stops 94. One end of each tone arm is pivoted at 95 to a horn 96 suitably mounted upon the frame of the instrument. The other end of the tone arm is provided with a sound box 97, which carries a diaphragm 98 and this diaphragm coöperates with a triplicate stylus lever 99, the several stylus levers being mounted upon the periphery of the sound box, as shown. One arm of the triplicate stylus lever is provided with a comparatively light needle, another with a heavy needle and still another with a needle of medium thickness. The sound box is rotatably mounted upon the end of the tone arm whereby any one of the three needles may be brought into engagement with the record groove formed in the periphery of the phonographic record cylinder 100. In this modification, as in the others, the record cylinder or cylinders or set of cylinders is provided upon its periphery with a set of record grooves, each groove adapted to produce a note of the diatonical musical scale. The cylinders or set of cylinders is mounted upon a shaft 101, whereby they may be rotated in any suitable manner such for example, as by means of an electrical or spring motor suitably governed and controlled to produce a uniform speed of cylinder movement.

Each of the sound boxes in the arrangement shown in Figs. 6 and 7, is provided with peripheral gear teeth 102 which mesh with the teeth 103 upon the associated regulating rack 104. The several racks 104 are joined to a frame 105 which in turn is provided with a pair of adjusting knobs 106, projecting through the face of the instrument. The frame 105 together with the

racks 104 may be placed in any one of three different positions, that is to say an intermediate position as shown in the drawings, an inner-most position where the buttons 106 engage the face of the instrument, and the other and outer-most position, where the cross-piece 106' engages the frame of the instrument. The intermediate position of the frame 105 is determined by a spring actuated plunger 107, which is pressed into a notch in the frame as shown in the drawing.

Assuming that the sound boxes of the set adapted to reproduce the several notes of the diatonic scale are in their intermediate positions as controlled by the racks 104 and as shown in Fig. 6, the depression of a key 91 will cause the associated tone arm 92 to be lowered until the stop 94 is engaged, under which condition the medium tone needle 108 will be dropped into the groove of the associated cylinder 100, whereupon the constant speed rotation of the cylinder will cause the production of a uniform note, having a pitch and tone quality dependent upon the undulations of the groove into which the needle has been dropped. The sound will be delivered from the tone arm, and the horn as in the horns heretofore described. When the pressure has been removed from the key 91, the spring will return the key to its normal position, whereupon the tone arm 92 will be raised to withdraw the needle of the sound box from the grooves shown in Fig. 6, thereby terminating the production of the sound controlled by that phonographic record.

If the operator desires a louder sound having the same pitch and tone quality, he will draw out the buttons 106 until the cross piece 106' engages the sleeve 109, whereby all of the sound boxes of the set will be rotated to bring their needles 110 into the position formerly occupied by the needles 108. Under these conditions as before, the notes sounded by the phonographic apparatus may be controlled by the manual keys, the only difference being that the sound will not be as loud as was formerly the case. If on the other hand, the operator desires an increased volume of tone, he will push the buttons 106 inwardly until they engage the face of the instrument. This movement will cause the sound boxes to be rotated upon their axes to bring their needles 112 into such positions, that the depression of the associated tone arms will bring them into engagement with the record grooves on the face of the cylinder 100. The sound boxes may desirably be slightly weighted at 111, to assist in maintaining their balance. The racks 104 are desirably hinged at 113 to the frame 105 so that there may be no disengagement between the gear teeth of the racks and those on the peripheries of the sound

boxes, when the sound boxes are depressed by means of the keys 91.

It will be apparent that I have not endeavored to illustrate the details of the design in which the various parts of the mechanism would be constructed in practice. For example the phonographic sound boxes are well known articles of manufacture, which those skilled in the art can adapt to suit the conditions imposed. It will be apparent also that other details, as well as cylindrical records may be adapted for use in an instrument of my invention.

It should perhaps be emphasized that the phonographic record, whether engraved upon a cylinder or upon a disk, must be substantially uniform throughout the entire length of the groove, that is to say the cylindrical grooves in the cylinders shown in the accompanying drawings must cooperate with their reproducers to produce steady, uniform tones of fixed pitch so long as the reproducing needles remain in the engagement with the record grooves.

While I have herein described the essential concept of my invention and have illustrated certain modes in which it may be embodied, I do not wish to be limited to the precise details of construction herein set forth, because obviously many modifications and many refinements may be made by those skilled in the art.

What I claim is:

1. In a phonographic instrument, the combination of a casing, a record engaging device, a key lever pivoted to the casing, and an arm carried by said lever disposed between the pivot and finger piece arranged to engage the under side of the said record

engaging device to normally prevent the engagement of the same with the record, the record engaging device being caused by gravity to engage the record when the arm is moved to release the under side of the same.

2. In a phonographic instrument, the combination of a casing, a key lever pivoted to the casing, a record engaging device swivelly mounted at substantially its central portion and adapted to swing in a vertical plane, an extension on said device, and an arm carried by said lever arranged to engage the under side of the said extension to normally prevent the engagement of said device with the record, the record engaging device being caused to engage the record when the arm is moved to release the under side of the extension.

3. In a phonographic instrument, the combination of a casing, a key lever pivoted to the casing, a record engaging device swivelly mounted at substantially its central portion and adapted to swing in a vertical plane, an extension on said device, and an arm carried by said lever disposed between the pivot and finger piece arranged to engage the under side of said extension to normally prevent the engagement of said device with the record, the record engaging device being caused to engage the record when the arm is moved to release the under side of the extension.

In witness whereof, I hereunto subscribe my name this 18th day of February A. D., 1914.

PETER HESSELIUS.

Witnesses:

A. G. DAHLQUIST,  
AUGUST H. L. ARNDT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



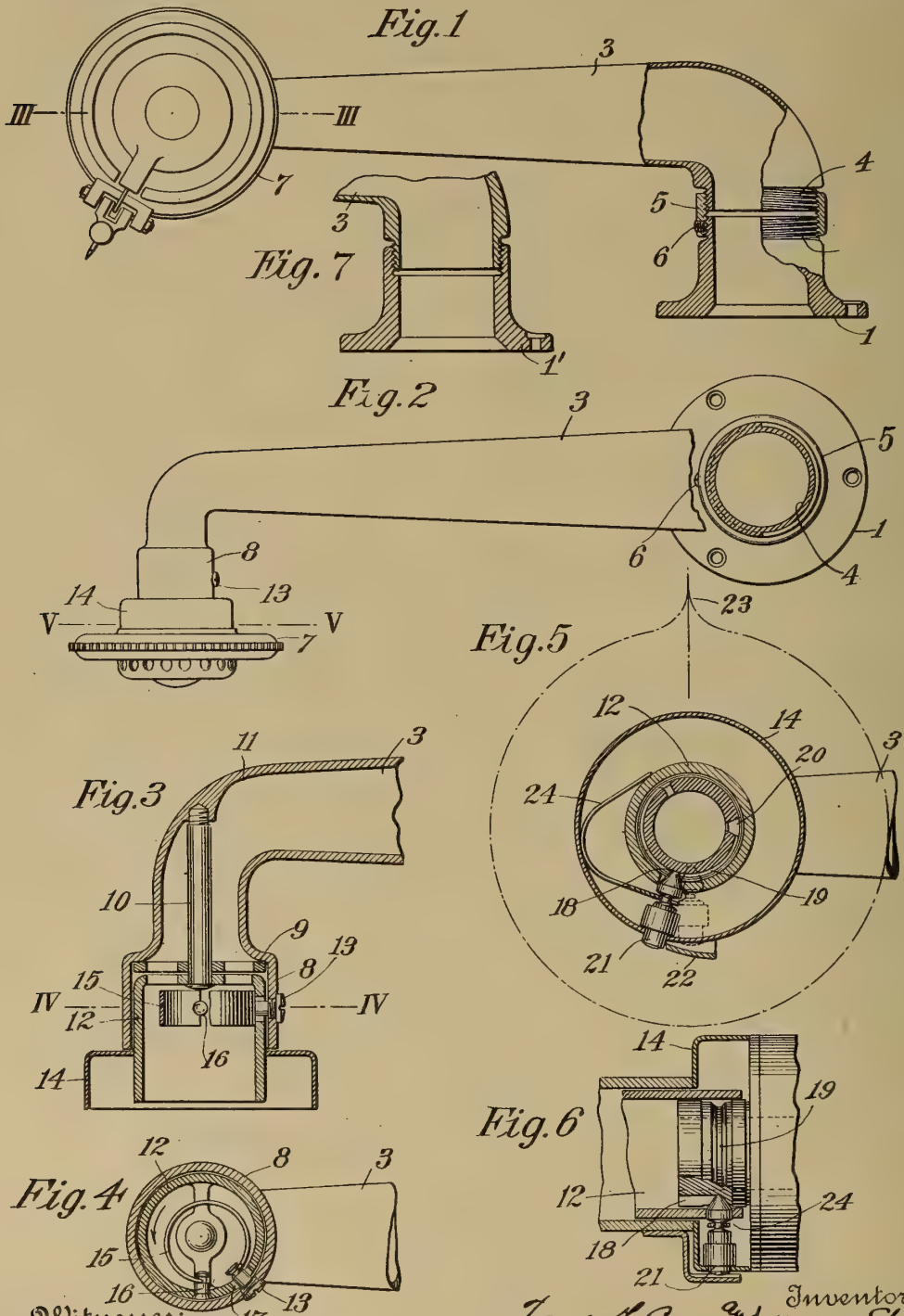


MOUNTING FOR SOUND BOXES,  
# 1,132,287-H. Sheble & F. L. Capps,  
Patented-March 16, 1915.  
Filed-October 17, 1912.

H. SHEBLE & F. L. CAPPS.  
MOUNTING FOR SOUND BOXES.  
APPLICATION FILED OCT. 17, 1912.

1,132,287.

Patented Mar. 16, 1915.



Witnesses:  
R.C. Fitzhugh.  
Geo. H. Anderson.

Inventors  
Frank L. Capps and Horace Sheble,  
By their Attorneys  
Mauro, Cameron, Lewis & Massie.



# UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, AND FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## MOUNTING FOR SOUND-BOXES.

1,132,287.

Specification of Letters Patent.

Patented Mar. 16, 1915.

Application filed October 17, 1912. Serial No. 726,253.

*To all whom it may concern:*

Be it known that we, HORACE SHEBLE and FRANK L. CAPPS, citizens of the United States, and residents of Philadelphia, Pennsylvania, and Bridgeport, Connecticut, respectively, have invented a new and useful Improvement in Mounting for Sound-Boxes, which invention is fully set forth in the following specification.

10 This invention relates to graphophones or other talking-machines, particularly of the type employed for reproducing disk sound-records. Such instruments are commonly equipped with a so-called "tone-arm" (a  
15 hollow arm swiveled to communicate with the stationary sound-conveyer or "horn," and carrying at its free end the usual sound-box with its diaphragm and stylus). Heretofore, such tone-arms have been mounted  
20 not only for horizontal swing but also to permit vertical swing, or there has been a joint in the tone-arm to permit the vertical swing. In such constructions, the weight of the sound-box or of the (entire) tone-  
25 arm bears upon the needle-point and forces it down upon the surface of the record-disk. Moreover, the mechanical construction of such joints or mountings for the tone-arm are more or less complicated and unsatis-  
30 factory, and the pressure which the dead weight imposes upon the needle-point has been found to wear out the record-groove unduly, thus destroying the life of the latter.

35 One object of the present invention is to provide an improved manner of mounting the pivoted end of the tone-arm, which shall be simple and reliable in construction, and which permits the tone-arm to swing in a  
40 substantially horizontal plane only, thus holding the dead weight away from the record-surface (but necessitating the provision of additional means for imparting the proper pressure to force the stylus against  
45 the record-groove).

A second object of the present invention is to provide suitable means of improved character for thus holding the stylus in proper yielding contact with the sound-  
50 record, while permitting the sound-box to be

adjusted for substitution of needles, and also for compensating automatically for irregularities in the surface of the turntable or in the thickness of the record-disk itself. The invention further comprises the various  
55 features of construction and arrangement hereinafter more fully set forth and claimed. Although the invention may be embodied in various forms, it will be best understood by reference to the annexed drawings, in  
60 which—

Figure 1 is a side view, partly in vertical section, of one embodiment of the invention; and Fig. 2 is a plan of the same; Fig. 3, on a larger scale, is a horizontal section  
65 through the line III—III of Fig. 1; Fig. 4 is a vertical section through the line IV—IV of Fig. 3; Fig. 5 is a similar view through the line V—V of Fig. 2; Fig. 6 is a longitudinal section of a detail; and Fig. 7 is a  
70 view, in vertical section, of a simple manner of mounting the pivoted end of the tone-arm.

In these drawings, 1 is the thimble or stationary ring, adapted to be secured upon or  
75 adjacent to the base-plate of the talking-machine, and communicating with the stationary sound-conveyer or horn (not shown). The upper end of this thimble is exteriorly  
80 screw-threaded, at 2.

3 is the substantially horizontal tone-arm, whose down-turned larger end is exteriorly screw-threaded at 4, but in the opposite direction to the screw-threads 2.

5 is a knurled coupling-ring fitting the  
85 adjacent ends of the two members and having the two sets of interior screw-threads engaging the threads 2 and 4 respectively. If desired, a set-screw 6 may pass through the ring to hold it stationary upon either mem-  
90 ber, as 1.

Any suitable sound-box (such as that of Patent No. 1,014,240) is carried at the free outer end of the tone-arm, so as to swing only in a horizontal plane. The sound-box,  
95 therefore, should have some means for holding its stylus in suitable engagement with the record, and for automatically compensating for irregularities in the plane surface of the turntable or in the thickness of  
100

the particular record-disk employed; and it should also have means for permitting a reproducing-stylus to be substituted.

A preferred construction for this purpose is illustrated in Figs. 3-6, illustrating an arrangement in which the sound-box is detachably secured to a cup that is journaled in the outer end of the tone-arm and acted upon by spring-pressure to force the stylus into proper contact with the record-disk. More specifically, an enlargement 8 is provided at the outer end of the tone-arm, and in this is secured a spider 9, having a central bearing, in which is journaled the rod 10, whose inner end is screw-threaded and turns loosely in a screw-threaded seat in the elbow 11 of the tone-arm. Upon the outer end of the rod 10, beyond the spider 9, is secured the cup 12, fitting rather snugly within the enlargement 8, to rotate freely therein; but a set-screw 13 passes through the enlargement 8 into an elongated slot in the cup, to limit the rotation of the latter. An outer cup 14 is secured to the cup 12, just beyond the end of the enlargement 8. A C-spring 15, located within the inner cup 12, is secured at one end to the inner end of the set-screw 13, and at its other end to the interior wall of the cup 12, as by a screw 16. The tension of this spring tends to rotate the cup 12 in the direction indicated by the arrow in Fig. 4 (counter-clockwise), but the amount of rotation is limited by the shoulder 17 of the slot abutting against the set-screw 13.

The sound-box 7 has at its rear the tube provided with the bayonet-joint groove consisting of the longitudinal portion 18 and the circumferentially-extending portion 19, the latter terminating in a counter-sunk seat 20. A spring-pressed plunger 21 passes through the walls of the cups 14 and 12, and its tapered end is adapted to engage the bayonet-groove of the sound-box, being forced downward into engagement therewith by means of the C-spring 24, located in the annular space between the two cups 12 and 14. A shield 22, lying at a diagonal to the tangent, is carried by enlargement 8 and extends over the head of plunger 21. This particular bayonet-joint and spring-plunger arrangement is found in the pending application, S. N. 505,459, and in itself is not our present invention, which, however, comprises the use of such spring-plunger bayonet-joint connection between the sound-box and a cup having limited axial reciprocation within the end of the tone-arm.

The operation of the device is obvious. The detachable sound-box is readily mounted or removed: to mount it, the longitudinal groove 18 is made to engage the tip of the plunger 21 and forced home, and turned

counter-clockwise until the plunger engages the counter-sunk seat 20; and to remove it, the reverse operation is performed. When the sound-box is in position, the stylus will occupy the position 23 indicated in Fig. 5; and the yielding-pressure of the C-spring 15 (Fig. 4) holds it in proper relation to the surface of the record-disk, the resiliency of the spring automatically compensates for variations in the thickness or plane surface of the record-disk or of the turntable. In removing the sound-box, it is turned counter-clockwise, against the tension of the C-spring 15, until the rear shoulder of the slot (of the cup 12) engages the set screw 13, after which the sound-box turns within the cup until the plunger 21 is in line with the longitudinal groove 18 of the bayonet-joint. In this position, the sound-box can be drawn out and removed, or a fresh needle can be substituted without removing the sound-box. In short, instead of securing the sound-box directly to the end of the tone-arm, there is an interposed member which has a limited spring-pressed axial play in the tone-arm, and the sound-box is detachably secured to this member.

We have thus described our invention with some particularity of detail, but only for the sake of clearness, since parts of our invention may be used to the exclusion of other parts, and modifications of construction and arrangement may be resorted to, without in any case departing from the spirit of our invention, which comprises broadly the simple mounting of the tone-arm at its stationary end so that it will have only horizontal play and will not impart its weight upon the stylus, and the provision of means for automatically adjusting the vertical position of the stylus-point and also for permitting change of needles, without having to provide a separate joint in the air-passage for that purpose.

Having thus described our invention, we claim:

1. As an article of manufacture, the herein described sound-conveyer, consisting of an exteriorly-threaded ring or thimble, a tone-arm having exterior screw-threads running in the opposite direction, a ring having two sets of interior screw-threads engaging the two screw-threads aforesaid, a sound-box and its stylus supported by the other end of said tone-arm, and means for holding said stylus yieldingly in proper relation to the record-disk.

2. In a talking-machine, the combination with a tone-arm mounted to swing in a horizontal plane only, of a spider secured in the end of said tone-arm, a cup fast upon a rod journaled in said spider, a spring to force said cup axially in one direction, means to



limit the amount of such rotation, and a sound-box detachably secured to said cup.

3. In a talking-machine, the combination with a screw-threaded ring secured adjacent  
5 the sound-conveyer or horn, a hollow arm for carrying the sound-box and having its opposite end screw-threaded, and a coupling-ring uniting the two members aforesaid by means of screw-threads engaging  
10 the two screw-threads aforesaid.

In testimony whereof we have signed this

specification in the presence of two subscribing witnesses.

HORACE SHEBLE.  
FRANK L. CAPPS.

Witnesses for Sheble:

C. A. L. MASSIE,  
RALPH L. SCOTT.

Witnesses for Capps:

VICTOR H. EMERSON,  
W. E. LYLE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."





PHONOGRAPH,  
# 1,132,497-J. L. Stevens,  
Patent-March 16, 1915.  
Filed-October 5, 1910.

J. L. STEVENS.

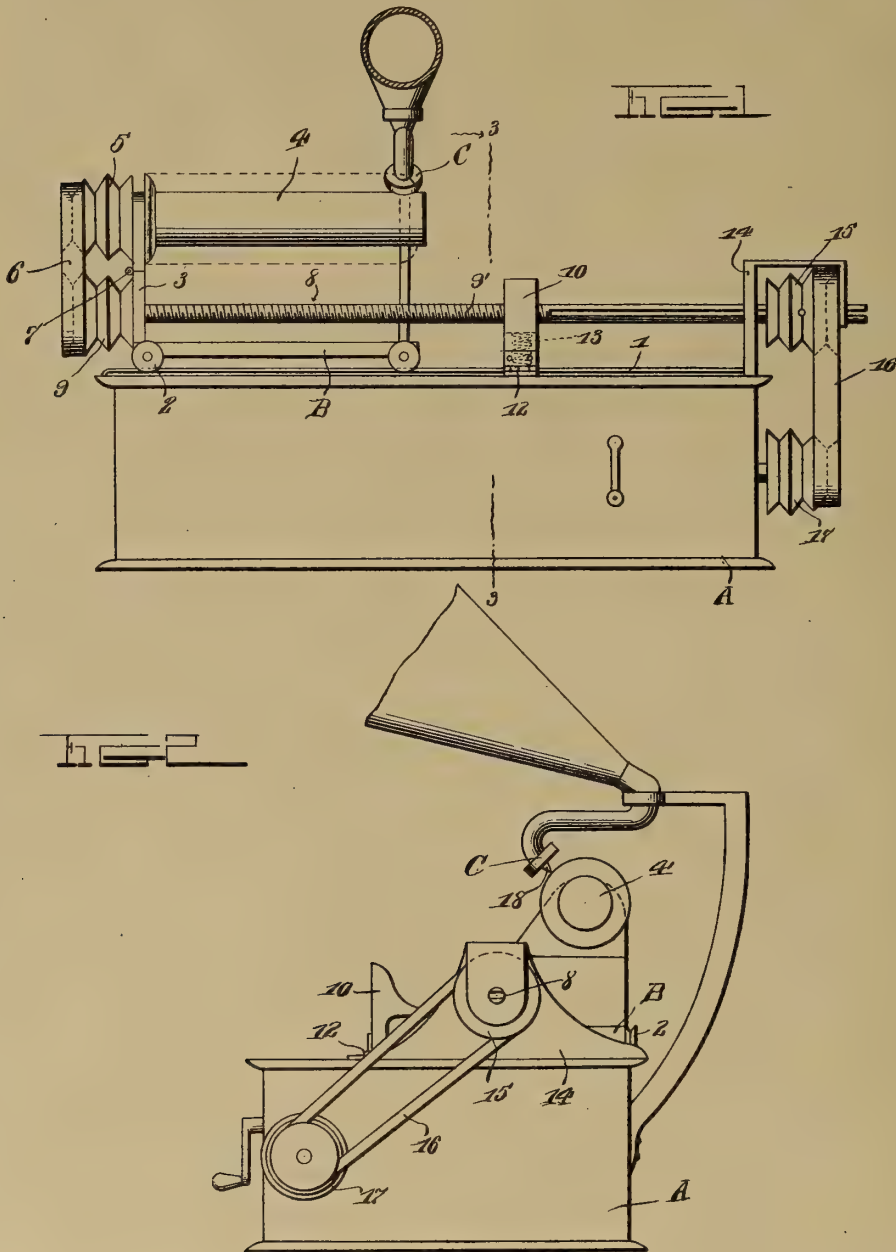
PHONOGRAPH.

APPLICATION FILED OCT. 5, 1910.

1,132,497.

Patented Mar. 16, 1915.

2 SHEETS-SHEET 1.



Inventor

John L. Stevens

Witnesses

J. H. Crawford

G. M. M. M. M.

By Victor J. Evans

Attorney





J. L. STEVENS.  
 PHONOGRAPH.  
 APPLICATION FILED OCT. 5, 1910.

1,132,497.

Patented Mar. 16, 1915.

2 SHEETS—SHEET 2.

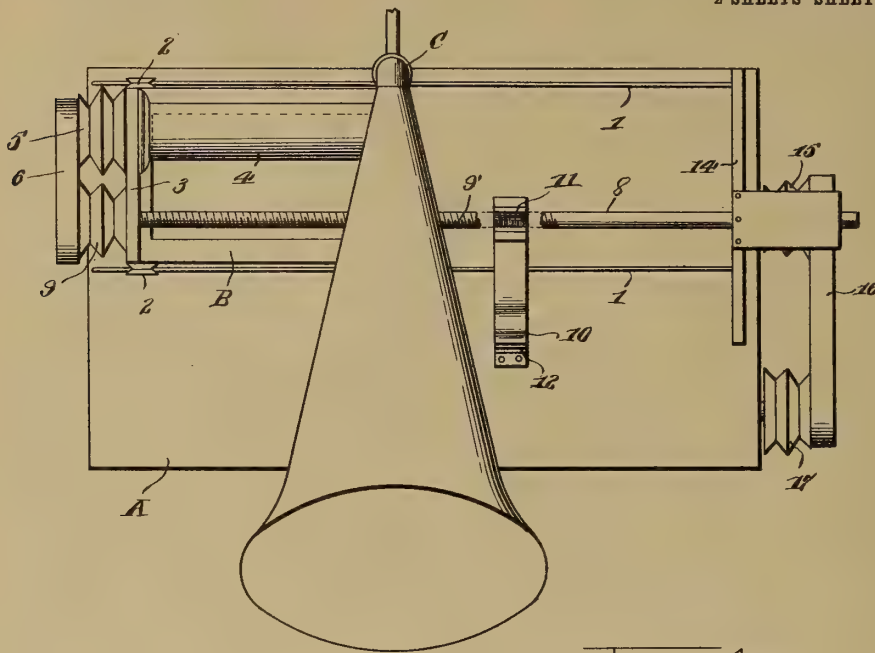


Fig. 4

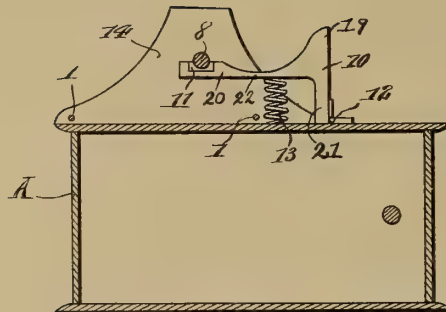


Fig. 5

Inventor  
 John L. Stevens,

By Victor J. Evans  
 Attorney

Witnesses  
 J. H. Crawford  
 J. H. Crawford,

# UNITED STATES PATENT OFFICE.

JOHN LYMAN STEVENS, OF SOUTH BEND, WASHINGTON.

## PHONOGRAPH.

1,132,497.

Specification of Letters Patent. Patented Mar. 16, 1915.

Application filed October 5, 1910. Serial No. 585,467.

*To all whom it may concern:*

Be it known that I, JOHN LYMAN STEVENS, a citizen of the United States, residing at South Bend, in the county of Pacific and State of Washington, have invented new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to phonographs of the cylinder record type and the principal object of the invention is to provide an improved phonograph in which the stylus and sound reproducer are stationary and the cylinder movable longitudinally thereunder.

Another object of the invention is to improve and simplify the construction and operation of apparatus of this character so as to be comparatively simple and inexpensive to manufacture, reliable and efficient in use and readily operated.

Another object of the invention is the provision of a novel record operating means for simultaneously rotating the record and giving it a movement of translation under the stylus of the reproducer which is stationary.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claim appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a front view of the phonograph. Fig. 2 is an end view thereof. Fig. 3 is a transverse section on the line 3—3 of Fig. 1. Fig. 4 is a plan view.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawings A designates the usual box or casing in which the motor mechanism, not shown, is mounted. On the top of this casing are two horizontal rails 1, which constitute a track on which travels a carriage B having grooved wheels 2 riding on the rails. This carriage has an upwardly extending pedestal or bearing 3 at one end in which is rotatably mounted a horizontal record cylinder 4, the journal of the record cylinder being provided with a stepped pulley 5 for receiving a belt 6 whereby the cylinder is driven. The pedestal or bearing is made of two parts connected together by a hinge 7 so that the cylinder can be thrown

upwardly to facilitate replacing or removal of the record.

Mounted in the lower part of the pedestal 3 is a rotating shaft 8, which is disposed parallel with the axis of the cylinder 4 and on one end is a reversely disposed stepped pulley 9 around which the belt 6 passes. This shaft is provided with screwthreads 9' of such a pitch that it will cause the cylinder to move longitudinally at the same rate as the sound producing groove in the record.

Mounted on the box A is an L-shaped support 10, provided with a finger piece 19, said support having seated in its long arm 20 a half nut 11 that engages under the threaded portion of the shaft. This support is hinged at 12 to the box and yieldingly held beyond a predetermined position by a spring 13, the support being rigidly held in a predetermined position by the end of the short arm 21 coming into flat contact with the upper surface of the casing A. The shaft slides through a bearing 14 on one end of the box A and at this bearing is a stepped pulley 15 that is keyed to the shaft so that the latter can slide back and forth in the pulley, the said pulley being rotated by a belt 16 that passes around a stepped pulley 17 on the drive shaft of the motor mechanism within the box A. By means of the belts 6 and 16 the speed of rotation of the record can be changed at will. Mounted on the box is the usual sound reproducing device C that includes a stylus 18 that rides on the record in the usual manner.

The nut 11 on the support 10 is disposed at one end of the shaft and as the motor is turned the shaft will rotate and cause rotation of the record. At the same time the nut will cause the shaft and carriage B with its attached parts to move longitudinally, thereby carrying the record under the relatively stationary stylus. When the end of the record has been reached it is merely necessary to depress the support 10 from the restricted resilient portion 22, thereby disengaging the nut 11 from the threaded shaft so that the carriage, together with its attached parts can be returned to its initial position for repeating the record or for applying a new one thereto.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily



apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus 5 which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claim appended hereto. 10

Having thus described the invention what is claimed as new, is:—

In combination with a phonograph casing, a feed screw and a half nut for said screw, of a support for said half nut comprising an L-shaped member having a long arm, a short arm and a finger piece, a hinge se-

cured to the short arm and casing for pivotally mounting said member on said casing, said member being rigidly supported in a 20 predetermined position by the end of the short arm adjacent said hinge coming into flat contact with said casing, and a spring interposed between the long arm and casing for yieldingly supporting the said member 25 beyond its predetermined position and in operative engagement with said screw.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN LYMAN STEVENS.

Witnesses:

H. W. B. HEWEN,  
IDA B. STARK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

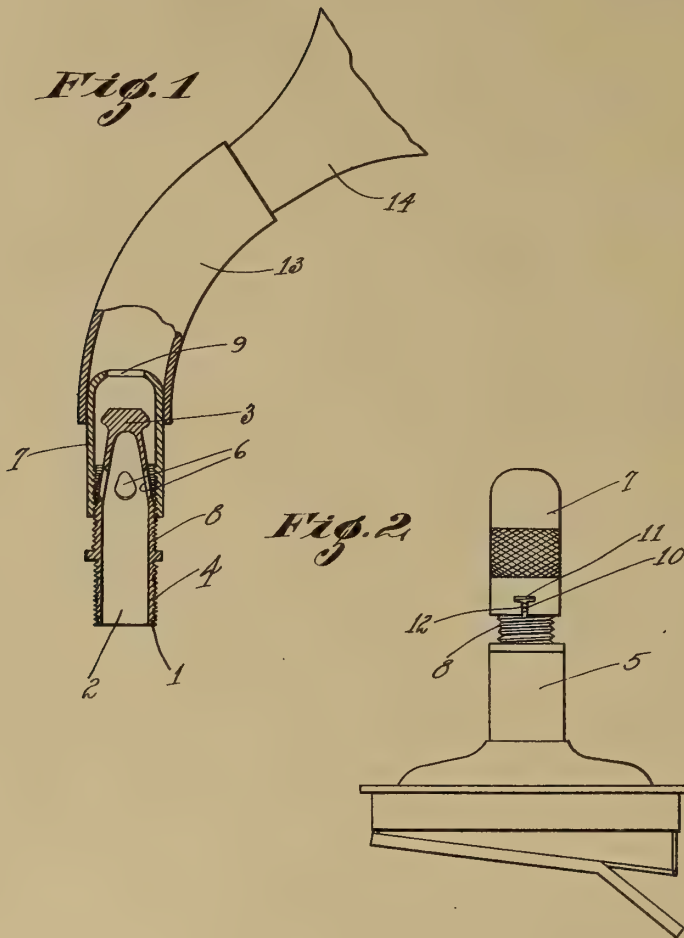
SOUND MODIFIER,

# 1,132,729----S. M. Macomber,  
Patented-March 23, 1915.  
Filed-June 23, 1914.

S. M. MACOMBER.  
SOUND MODIFIER.  
APPLICATION FILED JUNE 23, 1914.

1,132,729.

Patented Mar. 23, 1915.



WITNESSES:

J. B. Webster  
F. M. Blanchard

INVENTOR.

Samuel M. Macomber

BY

Jerry Stetson  
ATTORNEY



# UNITED STATES PATENT OFFICE.

SAMUEL M. MACOMBER, OF STOCKTON, CALIFORNIA.

## SOUND-MODIFIER.

1,132,729.

Specification of Letters Patent.

Patented Mar. 23, 1915.

Application filed June 23, 1914. Serial No. 846,778.

*To all whom it may concern:*

Be it known that I, SAMUEL M. MACOMBER, a citizen of the United States, residing at Stockton, in the county of San Joaquin, State of California, have invented certain new and useful Improvements in Sound-Modifiers; and I do declare the following to be a clear, full, and exact description of the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this application.

This invention relates to improvements in devices for the reproduction of sound, and particularly to that part known as the reproducer. By the addition of my improved invention the sound from the reproducer may be increased or decreased in volume, as may be desired.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purposes for which it is designed.

These objects, I accomplish by means of such structure and relative arrangement of the parts as will fully appear by a perusal of the following specification and claims.

On the drawings, similar characters of reference indicate corresponding parts in the several views.

Figure 1 is a partly broken out section of the modifier. Fig. 2 is a view showing the modifier as fastened to the reproducer.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 designates the main body portion of the device provided with a central orifice 2 leading to the closed tip 3, as shown.

At 4 are threads for screwing the modifier into the reproducer 5 as shown in Fig. 2. Through the member 1 are the openings 6 for the passage of the sound from the reproducer to the cap 7 mounted upon the threads 8 of the member 1. The opening 9 is adjusted by moving this cap 7 up or down on the threads 8, thereby giving a greater or smaller passageway for the emission of the sound around the tip 3 of said member 1. On the lower portion of the cap 7, I have

provided a vertical slot 10 adjacent a horizontal slot 11 by means of which when the tips 12 thus formed by said slots are bent slightly inward, a sufficient amount of pressure is brought to bear upon the threads 8 to form a lock to hold the cap 7 in any desired position. To the outer extremity of the cap 7 may be connected a rubber tube 13 leading to the horn 14 of a phonograph or talking machine. When a hornless instrument is used, the modifier may be connected in the conductor leading to the sound box placed below.

From the foregoing description it will readily be seen that I have produced such a device as substantially fulfils the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such details may be resorted to as do not form a departure from the spirit of the invention as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:—

1. A sound modifier of the type described comprising a centrally orificed member provided with openings in its sides, and a tip extending beyond said openings, and a cap threaded upon said member and inclosing said openings and said tip, said cap being provided with an opening in its end in substantial alinement with said tip, as described.

2. A sound modifier of the type described comprising a centrally orificed member tapered at one end, the small end of said tapered portion being closed and provided with an extended tip of a greater diameter than said tapered portion, said member being provided with openings in the sides of said tapered portion and a cap mounted on said member and inclosing said tapered portion, said cap having an opening in its end, as described.

3. A sound modifier of the type described comprising a centrally orificed member tapered at one end and provided with openings in its sides and an extended tip above

said openings, a threaded portion on said member and a cap provided with interior threads adapted to receive said threaded portion of said orificed member, such cap  
5 being provided with vertical slots in said threaded portion and horizontal slots registering with said vertical slots, as described.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL M. MACOMBER.

Witnesses:

STEPHEN N. BLEWETT,  
VUADINE WARNER.

TALKING MACHINE,

#1,133,685----P. Weber,

Patented-March 30, 1915.

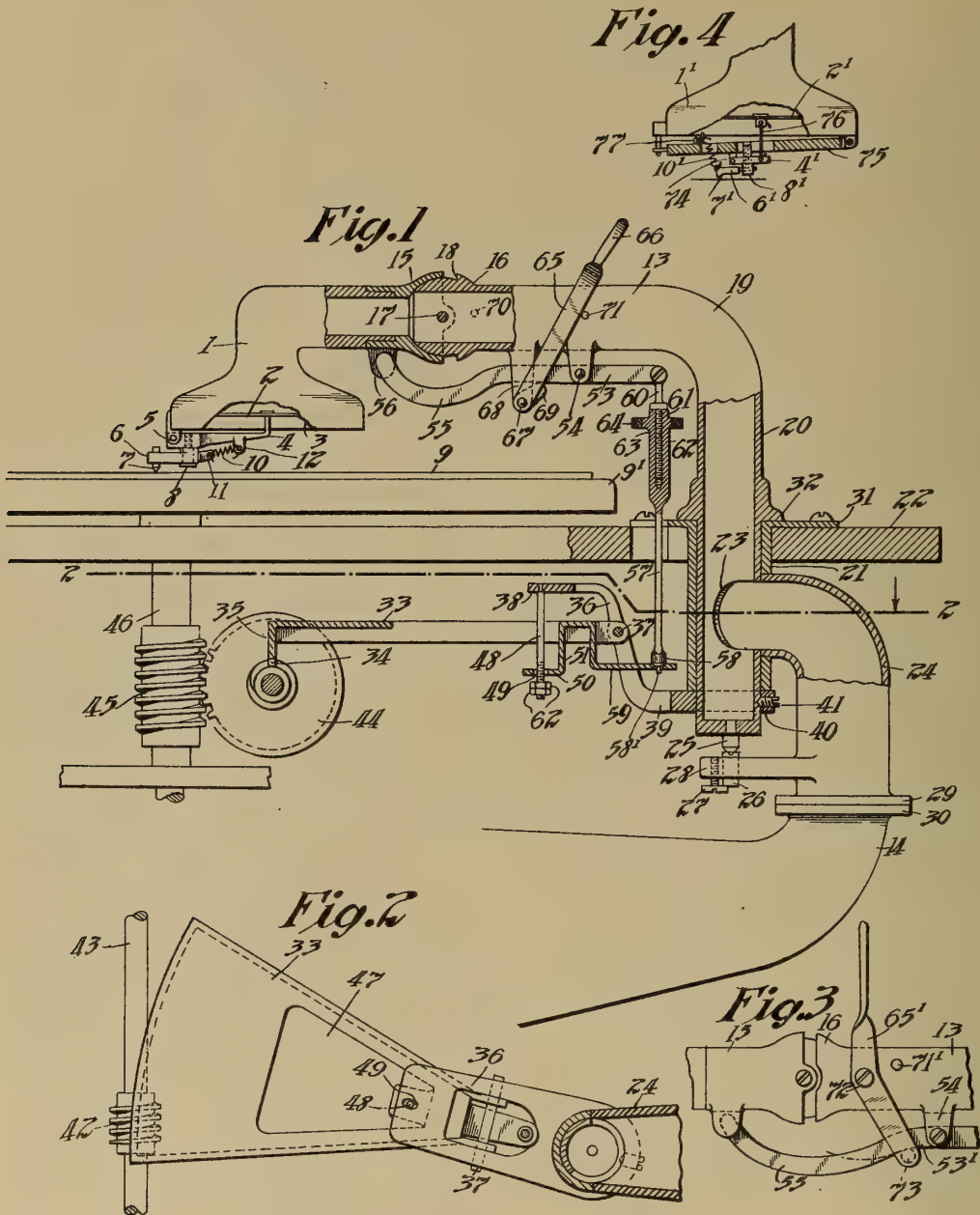
Filed-August 22, 1911.



P. WEBER.  
TALKING MACHINE.  
APPLICATION FILED AUG. 22, 1911.

1,133,685.

Patented Mar. 30, 1915.



*Witnesses:*  
Frank D. Lewis  
Frederick Bachmann

*Inventor:*  
Peter Weber  
by Frank L. Spier  
his Atty.

# UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY.

## TALKING-MACHINE.

1,133,685.

Specification of Letters Patent. Patented Mar. 30, 1915.

Application filed August 22, 1911. Serial No. 645,337.

*To all whom it may concern:*

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a description.

My invention relates to talking machines and more particularly, but not exclusively, to machines of the type in which a flat or disk record having vertically undulating record impressions is operated upon.

The principal object of my invention is the provision of improved means for controlling the feeding of the reproducer across the record surface, these means being preferably so constructed and arranged as to position the reproducer on or withdraw the same from the record surface simultaneously with the engagement and disengagement respectively of the usual feed nut and feed screw.

Another object of my invention is to provide a novel construction and mounting for the reproducer, whereby the stylus is permitted to follow the record groove regardless of irregularities therein. In conformity with this last named object, I preferably mount the stylus supporting member movably with respect to the body of the reproducer so that the stylus has great freedom in tracking the record groove and a mounting of small inertia is obtained.

In order that my invention may be better understood, attention is hereby directed to the accompanying drawings forming part of this specification, and in which—

Figure 1 represents an elevation partly in section of a portion of a talking machine embodying my invention; Fig. 2 represents a plan view partly in section taken on the line 2—2 of Fig. 1 of certain details of construction; Fig. 3 represents a side elevation of a modified form of a detail of construction; and Fig. 4 represents a side elevation partly in central vertical section of a modified form of reproducer constructed in accordance with my invention.

In all of the views, like parts are designated by the same reference numerals.

Referring to the drawings, the sound reproducer 1 comprises a diaphragm 2 mounted in a casing or support 3, an arm 4 hinged to the casing as at 5, and connected to the center of the diaphragm, and an arm 6 carrying

a stylus 7 and pivoted, as at 8, to the arm 4. The arms 4 and 6 extend substantially parallel to the diaphragm 2 and the surface of a record 9 mounted on the rotatable table or support 9', the arm 6 being preferably yieldably held in its central position, as by a tension spring 10 connected to an extension 11 on said arm and a lug 12 depending from the arm 4.

The reproducer shown and described above is adapted for use with records having vertically undulating record impressions, the mounting of the stylus in the pivoted arm 6 permitting the stylus to oscillate laterally and thereby faithfully follow the record groove regardless of the irregularities therein.

The reproducer is secured to the arm 13 of a sound conveyer or conduit leading to an amplifier 14, this arm being provided with a ball and socket joint comprising two members 15 and 16 connected by a pivot 17, whereby an up and down movement of the reproducer is permitted. This movement of the reproducer is limited by the engagement of the member 15 with the shoulder 18 on the member 16. The arm 13 of the sound conveyer is rearwardly directed from the reproducer, as shown, to a bend 19 whence it descends vertically as shown at 20 through a bearing 21 in the top 22 of the motor casing. The vertically directed portion 20 of the said arm is preferably closed at its lower end and is provided with a lateral opening 23 in register with the opening in the end of the horizontal portion of an angular sound conduit 24 which is rigidly secured to the bearing 21. The opening 23 is made of considerable width so as to permit pivotal movement of the arm 13 without closing or partially closing the said opening in the conduit 24. The lower end of vertical portion 20 of the arm 13 carries a pivot 25 whereby the said arm is rotatably mounted on a bearing 26 which is supported upon and capable of being adjusted vertically by a screw 27 mounted in a flange 28 projecting from the conduit 24. This conduit and the inner end of the amplifying horn 14 are secured together by flanges 29 and 30. The bearing 21, as shown, is provided with a flat plate-like portion 31 secured to the top of the motor casing, the vertical portion 20 of the arm 13 being provided with an annular projecting portion 32 adapted to en-



gage the portion 31 of the bearing 21 to support the arm 13 when the pivot 25 is sufficiently lowered or is removed.

In order to provide means for positively feeding the reproducer across the record surface, I provide a sector 33 having gear teeth 34 upon a flange 35 at the forward end thereof, this sector being supported from the inclined central portion of a bracket 36 by a horizontal pivot 37. The bracket 36 is provided at its ends with upper and lower horizontal portions 38 and 39 respectively, the lower portion 39 being formed with a collar 40 surrounding the portion 20 of the pivoted sound conduit and secured thereto by a screw 41. The teeth 34 on the sector are adapted to be held by the action of gravity on the pivoted sector in mesh with a suitable driving member, such as a worm 42 mounted on a shaft 43 connected by suitable gearing 44 and 45 to the motor shaft or spindle 46 which carries the record support 9'. The sector 33 is provided with an opening 47 through which extends a vertical pin 48 supported by the portion 38 of the bracket 36. This pin extends near its lower end through an elongated radial slot 49 in a flange 50 projecting horizontally from a downwardly directed portion 51 of the sector. By reason of the above construction, the rack 33 is capable of a limited up and down movement about its pivot 37, so as to permit the teeth 34 to be engaged with and disengaged from the worm 42. Nuts 62 are threaded on the lower end of the pin 48 to limit the downward movement of the sector when the worm 42 or the motor is removed.

In the embodiment shown in Fig. 1, the teeth on the sector are disengaged from the worm 42 and the reproducer lifted from the record surface by the following mechanism: A lever 53 is pivoted between lugs 54 depending from the arm 13 and is provided at its forward end with a curved portion 55, the outer end of which is adapted to engage the member 15 between depending ears or lugs 56. The lever 53 is pivotally connected at its opposite end with a link 57 provided at its lower end with an enlarged head 58 bearing on the top of the extension 59 on the sector 33, the head 58 being provided with a pin 58' extending loosely through an opening in said extension. This link is preferably formed in two sections 60 and 61 having a threaded connection as shown at 62 so as to make possible an adjustment of the effective length of the link. The section 61 is weighted as shown at 63 to hold the head 58 in engagement with the sector, a knurled flange 64 being provided on the section 61 to adjust the length of the link. A forked lever 65 provided with a handle 66, extends over the arm 13 and is secured at its lower end to a pivot 67 mounted in depending lugs

68 on the said arm 13, a cam or projection 69 being also secured to the pivot 67 between the lugs 68 and being adapted to engage the forward arm of the lever 53. The numerals 70 and 71 represent stops for limiting the movement of the lever 65. It is evident that by merely drawing the lever 65 forwardly, the rear arm of the lever 53 is depressed to cause the link 57 to raise the forward end of the sector and thereby disengage the teeth 34 on the sector from the worm 42 and the forward arm of said lever 53 is raised to lift the reproducer from the record surface.

In the modification shown in Fig. 3, the lever 65' is pivoted intermediate its ends, as at 72, to the arm 13 and is provided adjacent its lower end with a pin or projection 73 adapted to engage the curved portion 55 of the lever 53' to cam the forward end of the latter upwardly and lift the reproducer from the record surface, when the upper end of the lever 65' is moved rearwardly. The numeral 71' represents a stop for limiting the movement of the lever 65' when the reproducer is lifted from the record surface.

In Fig. 4 I have shown a form of my improved reproducer provided with a floating weight. In this figure the arm or lever 6' is provided with a stylus 7', and is supported, as by a pivot 8', from the arm 4' which is pivoted at one end, as at 74, to a floating weight 75 hinged to the diaphragm casing or support 1'. The opposite end of the arm 4' is connected, as by a link 76 to the center of the diaphragm 2'. A spring 10' connected to the stylus carrying end of the arm 6' and to a hook 77 on the floating weight serves to hold the said arm in central position. The arms 4' and 6' are located substantially parallel to the floating weight and the diaphragm 2' and are adjustable similarly to the arms 4 and 6 shown in Fig. 1 during the tracking of the record groove by the stylus.

While I have described particular mechanism for the sake of clearness, it is obvious that my invention is not limited to the specific details of construction described, but that many modifications may be made therein without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States, is as follows:

1. In a talking machine, the combination of a rotatable record support, an arm pivoted to move transversely of said support, a sound box supported by said arm and movable toward and away from the record surface, a stylus carried by said sound box, a lever carried by said arm and adapted to effect movement of the sound box, feeding means connected with said arm, driving means for said feeding means, adjustable



means operatively connecting said lever and said feeding means, and means for moving said lever to cause said connecting means to disengage said feeding means from said driving means and to move said sound box away from the record support substantially as described.

2. In a talking machine, the combination of a rotatable record support, an arm pivoted to move transversely of said support, a sound box supported by said arm and movable toward and away from the record surface, a stylus carried by said sound box, a lever carried by said arm, and adapted to effect movement of the sound box, feeding means connected with said arm, driving means for said feeding means, an adjustable link for operatively connecting said lever and said feeding means, and means for moving said lever to disengage said feeding means from said driving means and to move the sound box so as to disengage the stylus from the record surface, substantially as described.

3. In a talking machine, the combination with a record support, a reproducer, and means for supporting said reproducer, of driving means, pivotally mounted feeding means coacting with said driving means, a lever separate from said feeding means, adjustable means operatively connecting said lever and said feeding means, and means for moving said lever to cause said connecting means to move said feeding means about its pivot to thereby disengage the same from said driving means, substantially as described.

4. In a talking machine, the combination with a record support, a reproducer, and means for supporting said reproducer, of driving means, feeding means coacting with said driving means and connected with said supporting means for feeding the reproducer across the record surface, a lever pivoted to said supporting means, a weighted link connected with said lever and engaged with but not secured to said feeding means, and means for moving said lever to disengage said feeding means from said driving means, substantially as described.

5. In a talking machine, the combination with a record support, a reproducer, and means for supporting said reproducer, of driving means, feeding means coacting with said driving means and connected with said supporting means for feeding the reproducer across the record surface, a lever pivoted to said supporting means, a weighted link connected with said lever and engaged with but not secured to said feeding means, means for moving said lever to disengage said feeding means from said driving

means, and means for limiting the movement of said feeding means, substantially as described.

6. In a talking machine, the combination with a record support, a reproducer, and means for supporting said reproducer, of driving means, feeding means coacting with said driving means, and means comprising a lever pivoted to said supporting means and a weighted link for disengaging said feeding means from said driving means, said link being pivotally connected to said lever at one end and operatively connected to said feeding means at its other end, substantially as described.

7. In a talking machine, the combination with a record support, a reproducer, and means for supporting said reproducer, of driving means, feeding means coacting with said driving means and means comprising a lever and an adjustable link for disengaging said feeding means from said driving means, said link being connected at one end to said lever and being engaged with but not secured to said feeding means at its other end, substantially as described.

8. In a talking machine, the combination of a record support, an arm pivoted to move transversely of said support, a sound box supported by said arm and movable toward and away from said support, driving means, feeding means comprising a member secured to said arm and a member pivotally connected to the first member and coacting with said driving means, and means for simultaneously moving said second named member of the feeding means about its pivot to disengage the same from said driving means and for moving said sound box away from said record support, substantially as described.

9. In a talking machine, the combination of a record support, an arm pivoted to move transversely of said record support, a sound box supported by said arm and movable with respect thereto toward and away from said record support, driving means, feeding means comprising a member secured to said arm and a device movably connected to said member and coacting with said driving means, and unitary means for moving said device to disengage the same from said driving means and for moving said sound box with respect to said arm and away from said record support, substantially as described.

This specification signed and witnessed this 17th day of August 1911.

PETER WEBER.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.



SOUND BOX,

# 1,133,883---W. E. Parker,  
Patented-March 30, 1915.  
Filed-Sept. 25, 1912.



W. E. PARKER.

SOUND BOX.

APPLICATION FILED SEPT. 25, 1912.

1,133,883.

Patented Mar. 30, 1915.

Fig. 1

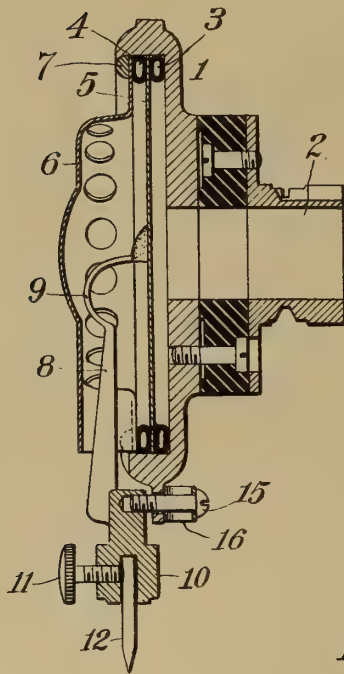


Fig. 2

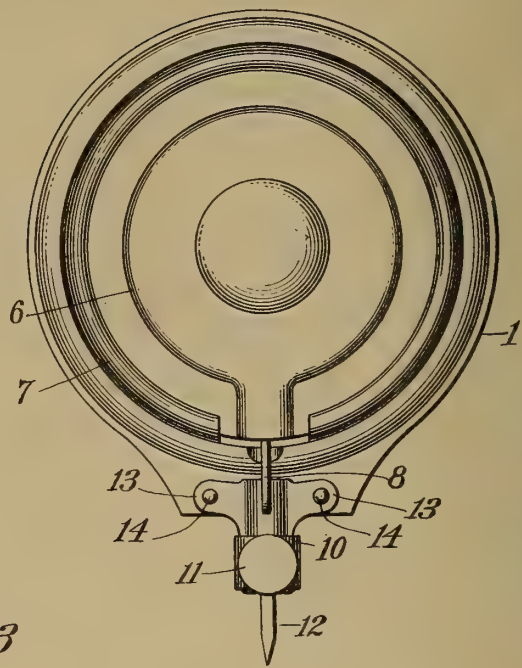
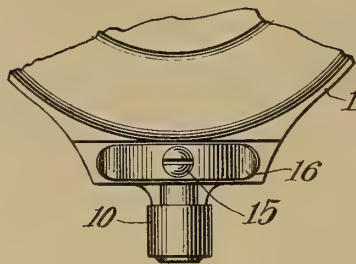


Fig. 3



Witnesses  
E. E. Garfield  
R. C. Fitzhugh

Inventor  
William E. Parker  
By his Attorneys  
Mauro, Cameron, Lewis & Mason

# UNITED STATES PATENT OFFICE.

WILLIAM E. PARKER, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN  
GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF  
WEST VIRGINIA.

SOUND-BOX.

1,133,883.

Specification of Letters Patent.

Patented Mar. 30, 1915.

Application filed September 25, 1912. Serial No. 722,257.

*To all whom it may concern:*

Be it known that I, WILLIAM E. PARKER, a citizen of the United States, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Sound-Boxes, which invention is fully set forth in the following specification.

This invention relates to sound-boxes for talking-machines, and consists of novel means for fulcruming the stylus-bar upon the sound-box.

The invention comprises a novel arrangement of cone-bearings, novel means of applying adjustable and yielding pressure to hold the parts together, and various features of construction and arrangement that are hereinafter pointed out and claimed.

This invention will be best understood by reference to the annexed drawings that illustrate a preferred embodiment thereof. In these drawings,—Figure 1 is a sectional view taken transversely through a sound-box employing the present invention; Fig. 2 is a face view of the same; and Fig. 3 is a rear view of a detail.

The sound-box comprises the usual shallow cup 1, having the tube 2 at its rear, preferably provided with a bayonet-joint groove for detachable connection with the tone-arm.

3 and 4 are the usual rubber gaskets, one on each side of the (mica) diaphragm 5; and 6 is the shield held in place by the split spring-ring 7, engaged under the overhanging lip of the cup 1. At the center of the diaphragm is secured the stylus-bar 8, shown as having the arched portion 9 and extending in a radial direction to its fulcrum on a projection from the sound-box. This stylus-bar carries the usual barrel 10 with thumb-screw or the like 11, for securing the reproducing needle 12, all as set forth in the Macdonald Patent No. 1,014,240, of January 9, 1912. From either side of the stylus-bar extend the wings 13—13, parallel to the abutment of the sound-box. From the adjacent face of said abutment rise the two cone-pointed bearings located at 14—14, at right angles to the line of the stylus-bar; the inner face of the wings 13—13 are provided

with cone-seats that receive these points. 15 50  
is a screw passing freely from the back of said abutment and engaging a screw-threaded seat in the inner face of the stylus-bar. 16 is a bow-spring, interposed between the head of the screw and the rear face of said abutment, the spring being apertured to receive the shank of the screw. Upon turning the screw down, in its seat in the inner face of the stylus-bar, the spring 16 is flattened and its tension forces the cone-seats of wing 13 against the points with yielding pressure, which may be regulated at will by turning the screw either inward or outward.

It will be seen that I have provided a novel manner of mounting the stylus-bar upon the sound-box by yielding tension; that the axis is in a single straight line at right angles to the line of the stylus-bar. And preferably the center of the diaphragm, the two cone-bearings, and the tip of the reproducing needle, will all lie in substantially the same plane.

Having thus described my invention, I claim:

In a sound-box, the combination of a diaphragm-receiving casing having an off-set with a hole therethrough, a diaphragm mounted in said casing, a stylus-bar lying radially of said diaphragm and extending above said hole, two wings parallel to said diaphragm, and extending from said bar in opposite directions, a fulcrum-bearing between each wing and the adjacent portion of said off-set, a headed screw passing freely through the hole aforesaid and adjustably engaging said bar, and a centrally-apertured bow-spring surrounding said screw and pressing against the under side of the head thereof and having its two ends respectively exerting pressure against the offset opposite the two spaced fulcrum-bearings aforesaid.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM E. PARKER.

Witnesses:

M. E. LYLE,

GEORGE H. SYMONS.

# THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA

BY

WILLIAM F. BAKER

The history of the United States is a story of the growth of a nation from a small group of colonies to a great power. It is a story of the struggles of the people to establish a government that would protect their rights and promote their welfare. The story begins with the first settlers who came to the New World in search of a better life. They found a land of opportunity, but also a land of hardship. They had to fight against the elements of nature and the resistance of the native Americans. They had to build a new society from scratch. The story continues with the struggle for independence from Britain. The people of the colonies wanted to be free to govern themselves. They fought a war that was long and bloody. They won, but the cost was high. The story then tells of the years of peace and the growth of the nation. The people built a great country, one that was respected by all. The story ends with the present day, a time of great achievement and great challenges. The people of the United States are proud of their history and their future.



Automatic talking machine,  
#1,134,603,-----J. Gabel,  
Patented-April 6, 1915.  
Filed-February 26, 1906.

**1,134,603.**

Fig. 1.





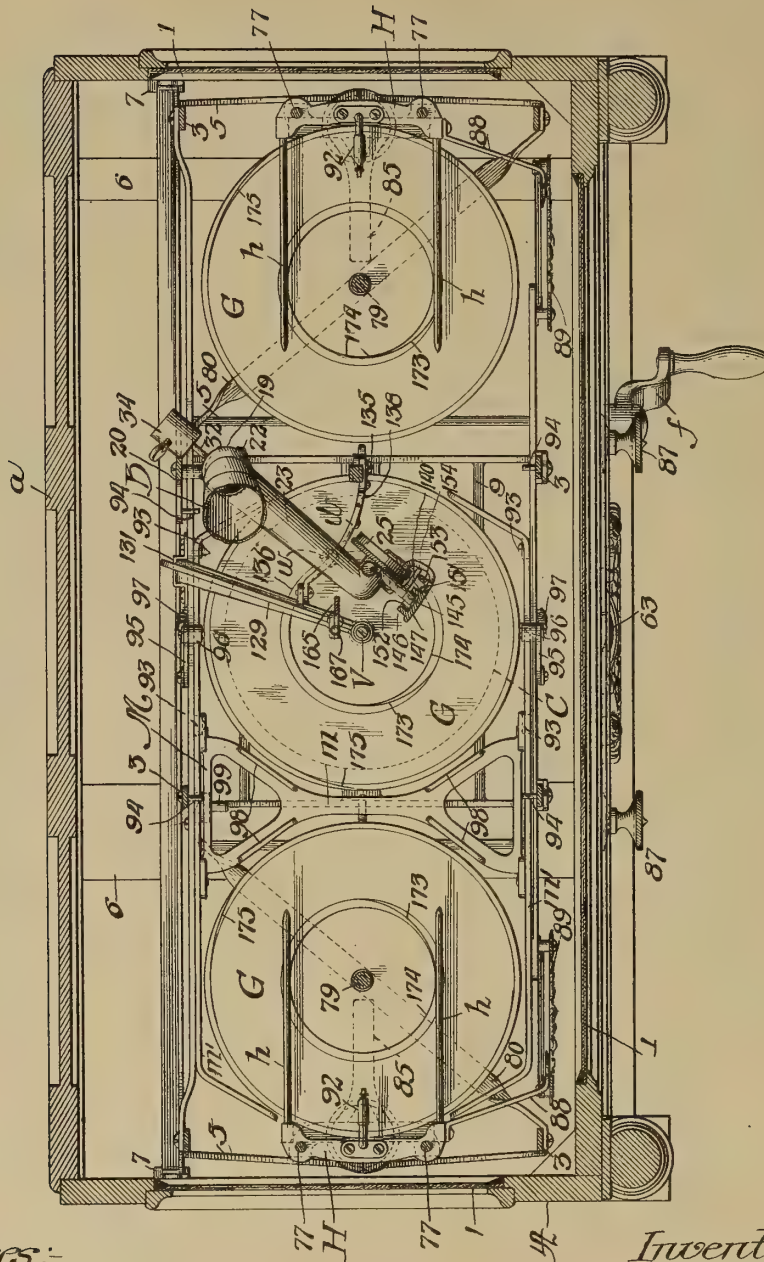


J. GABEL.  
AUTOMATIC TALKING MACHINE.  
APPLICATION FILED FEB. 26, 1906.

1,134,603.

Patented Apr. 6, 1915.  
9 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

Wm. H. Whitehead  
Lillian Prentice

Inventor:

John Gabel  
by: Pierce & Fisher  
Attys.



J. GABEL.  
 AUTOMATIC TALKING MACHINE.  
 APPLICATION FILED FEB. 26, 1906.

1,134,603.

Patented Apr. 6, 1915.  
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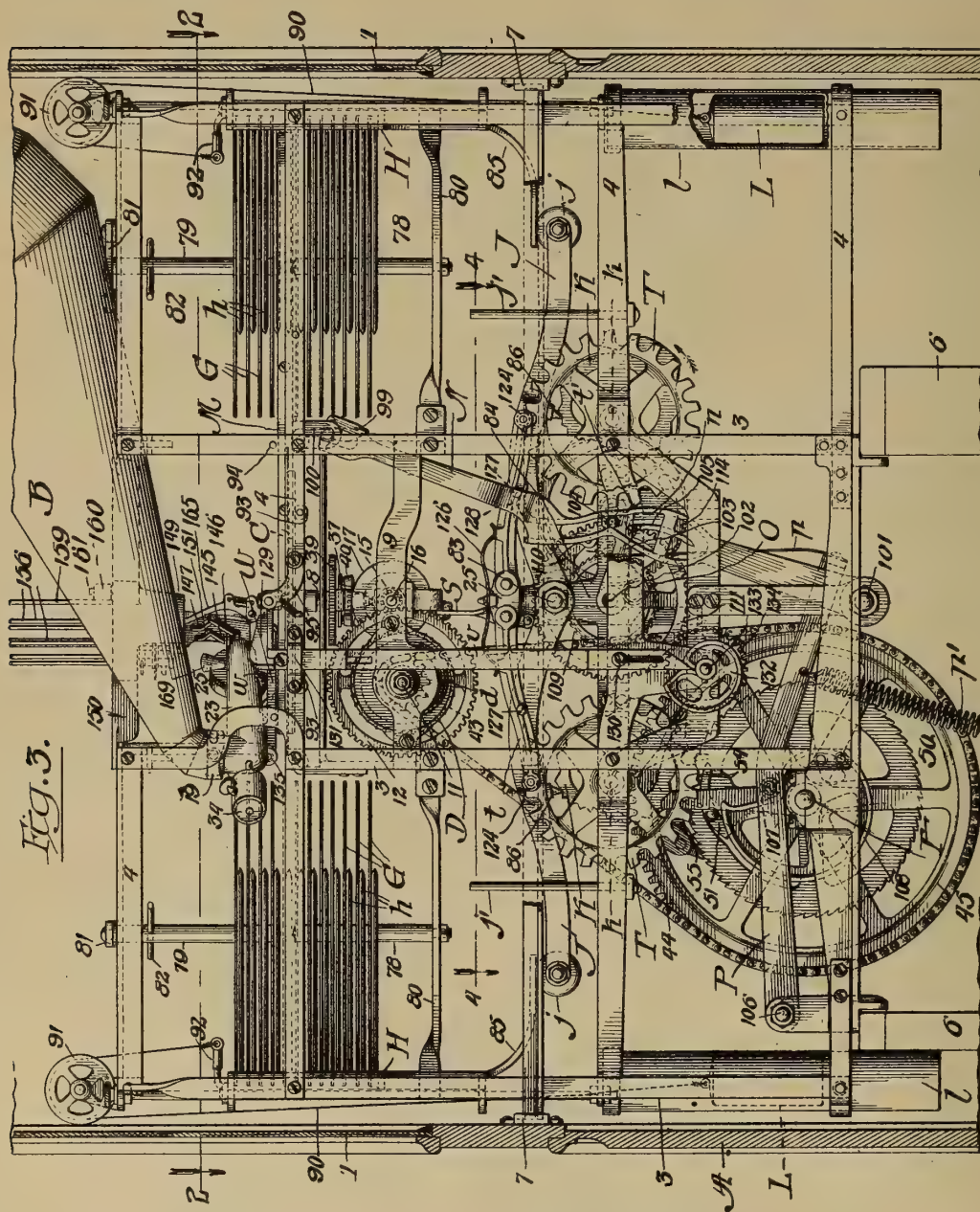


Fig. 3.

Witnesses:-

John M. Whitehead  
 Lillian Prentiss

Inventor:-

John Gabel

By:- Pierce & Fisher  
 Attys.





J. GABEL.  
 AUTOMATIC TALKING MACHINE.  
 APPLICATION FILED FEB. 26, 1906.

1,134,603.

Patented Apr. 6, 1915.

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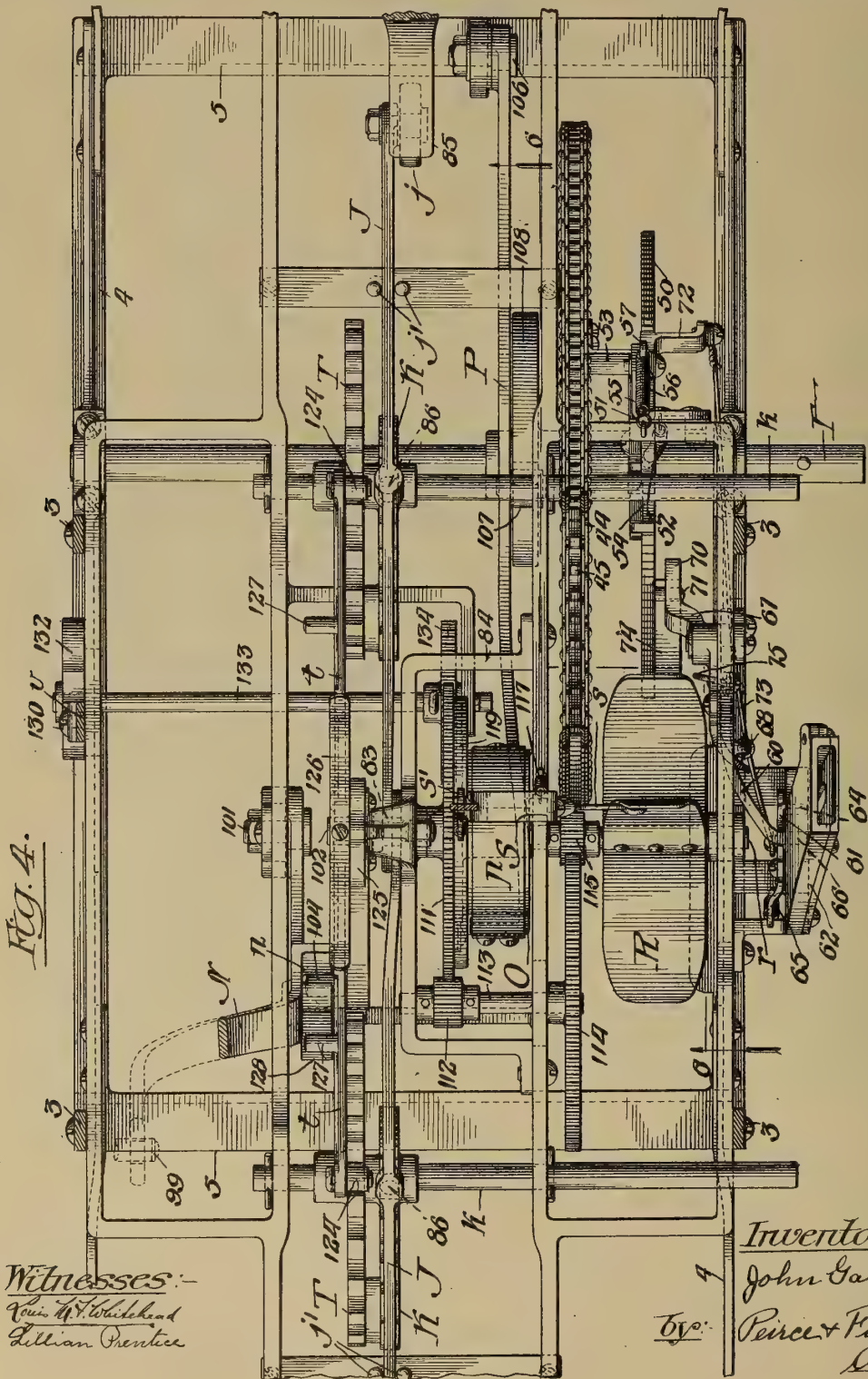


Fig. 4.

Witnesses:  
 John H. Whithead  
 William Prentice

Inventor:  
 John Gabel  
 By: Pence & Fisher  
 Attys



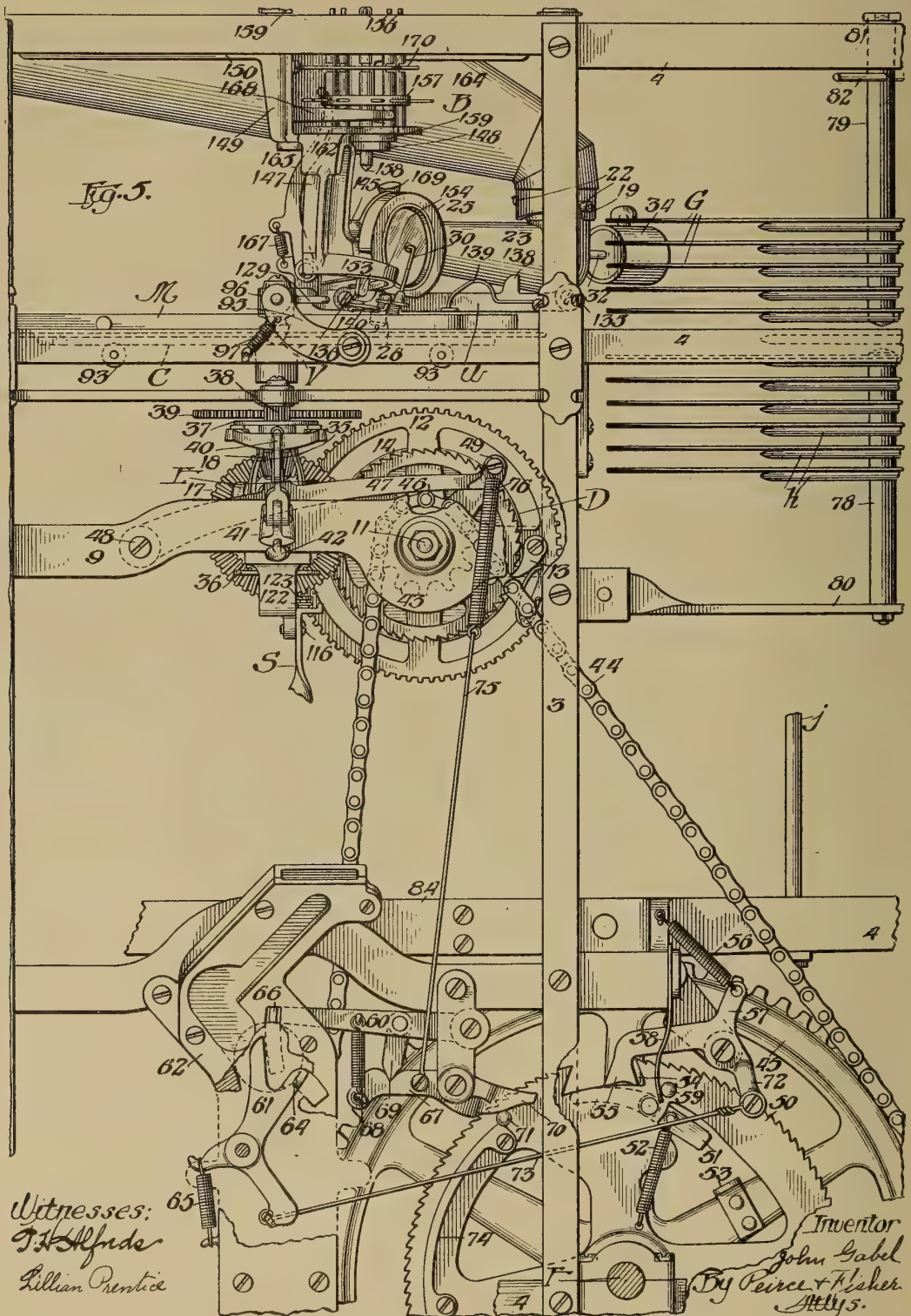


J. GABEL.  
 AUTOMATIC TALKING MACHINE.  
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1,134,603.

Patented Apr. 6, 1915.

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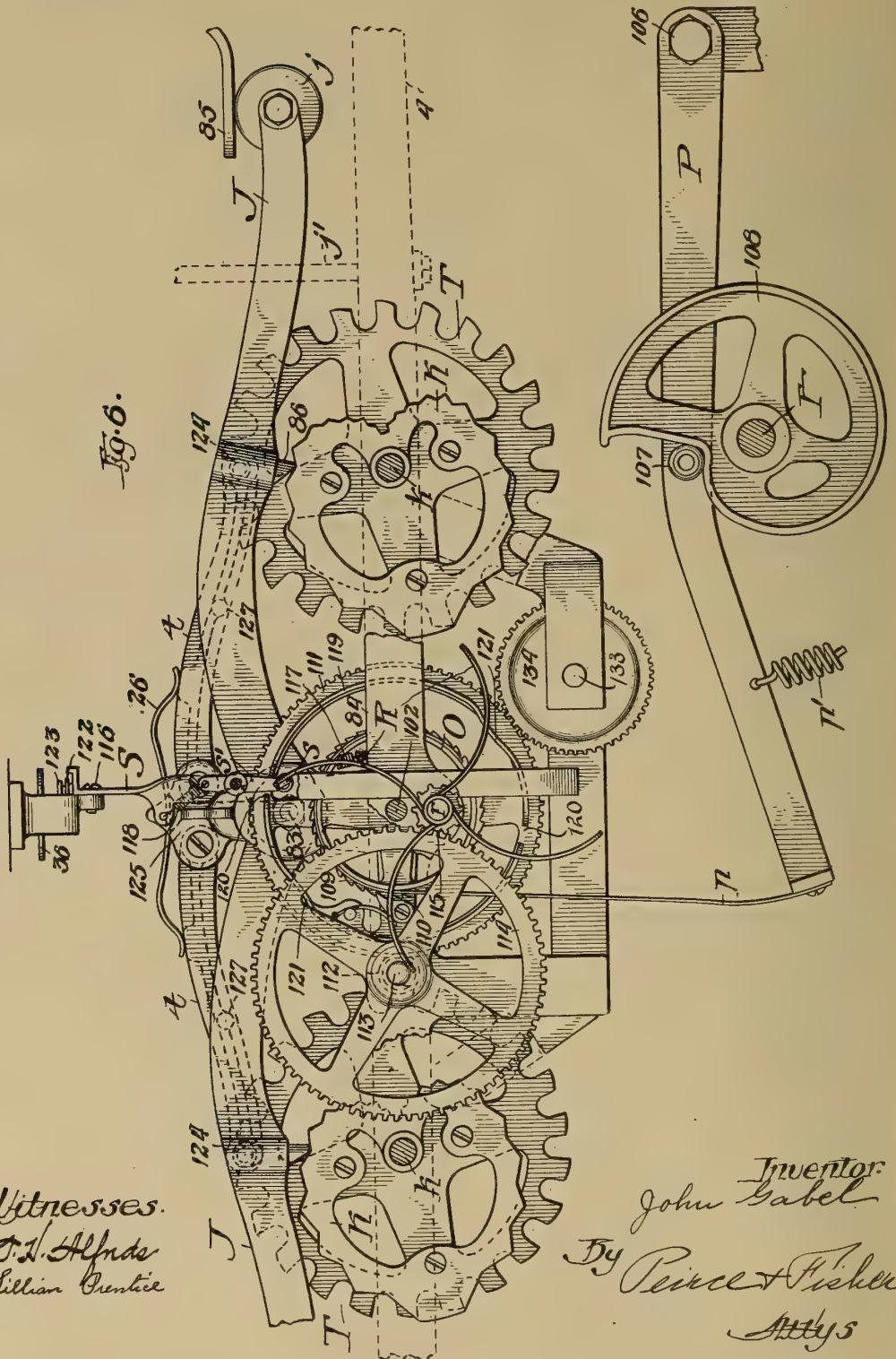




1,134,603.

J. GABEL.  
AUTOMATIC TALKING MACHINE.  
APPLICATION FILED FEB. 26, 1906.

Patented Apr. 6, 1915.  
9 SHEETS—SHEET 8.



Witnesses.  
J. I. Alford  
Lillian Orentice

Inventor:  
John Gabel  
By Pince & Fisher  
Attys



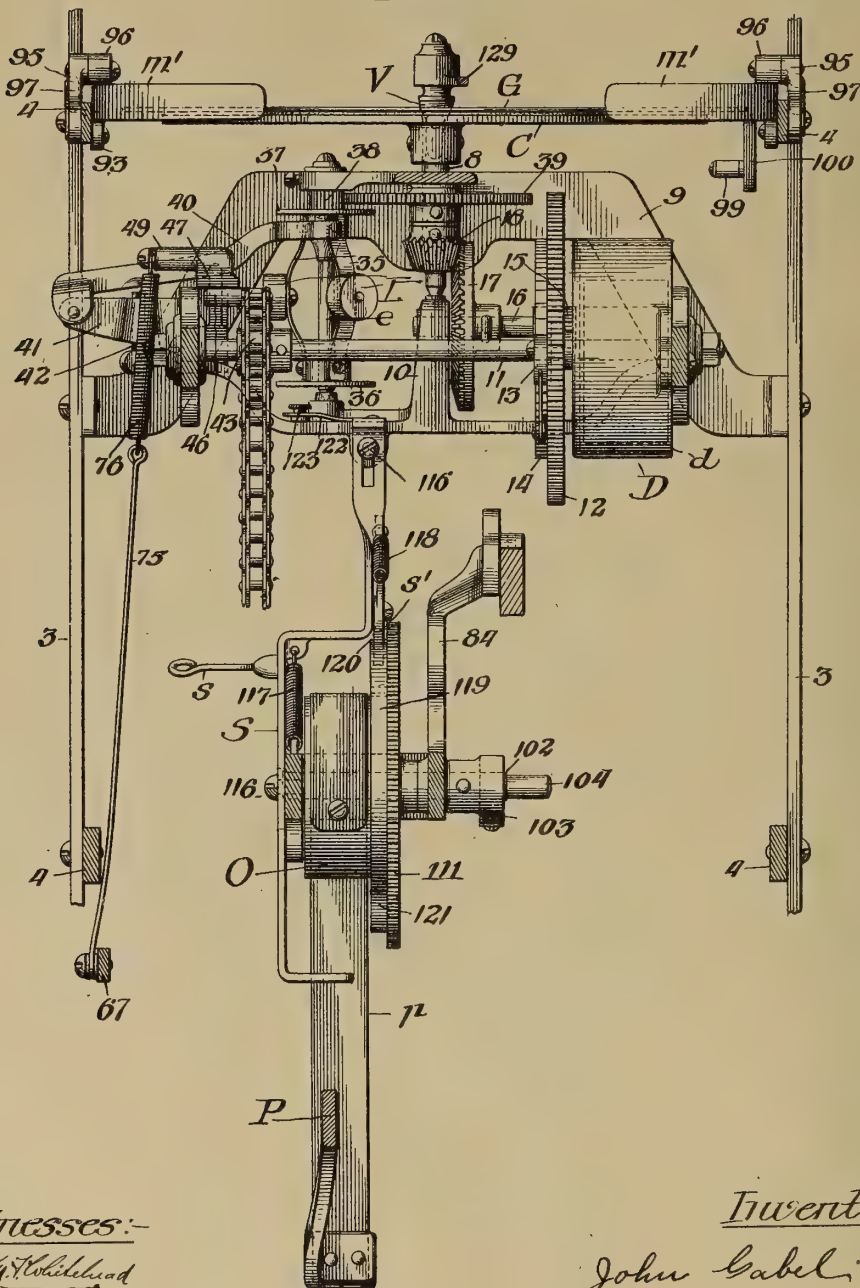


J. GABEL.  
 AUTOMATIC TALKING MACHINE.  
 APPLICATION FILED FEB. 26, 1906.

1,134,603.

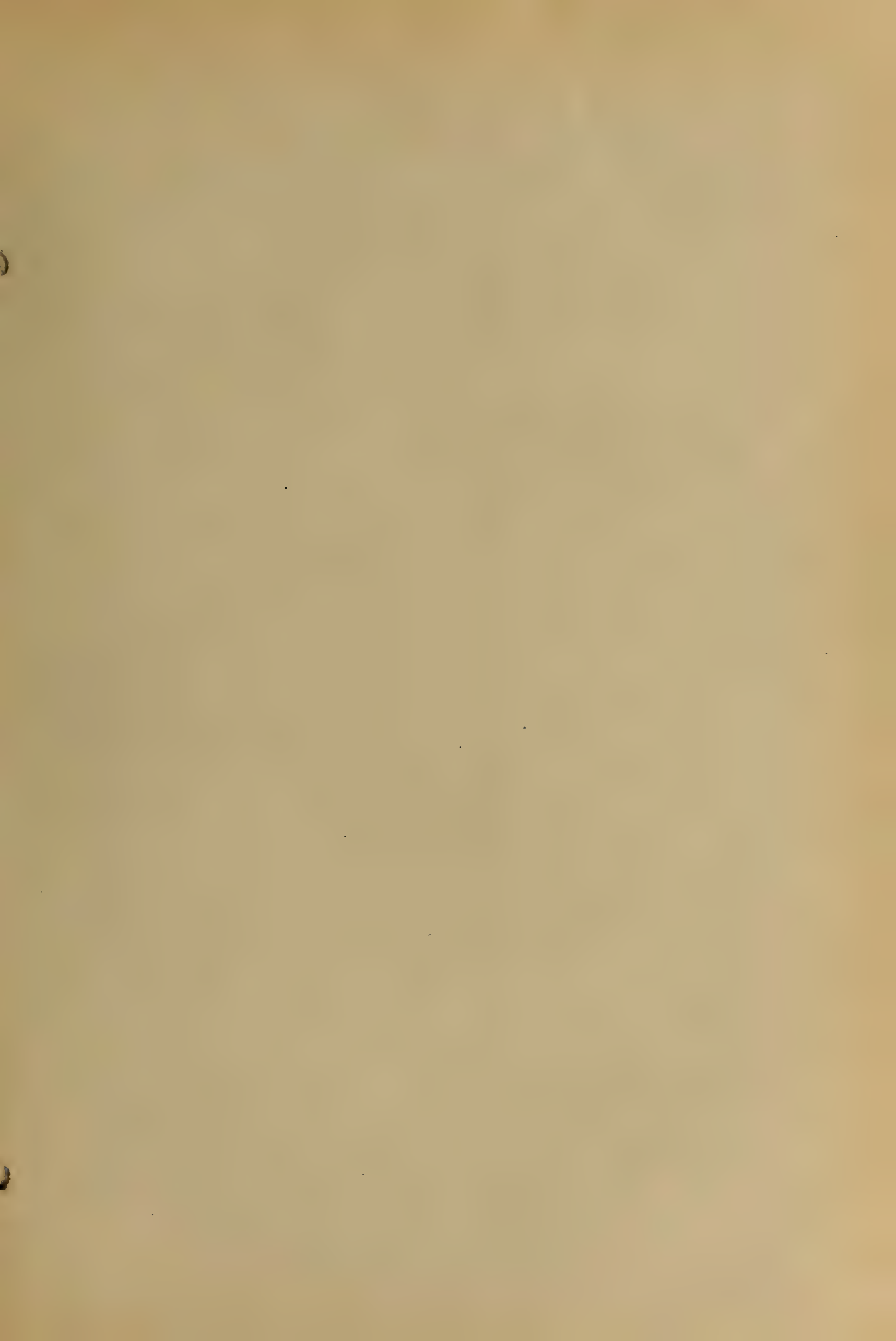
Patented Apr. 6, 1915.  
 9 SHEETS—SHEET 7.

*Fig. 7.*



*Witnesses:-*  
*Wm. H. Whitehead*  
*William P. Buntice*

*Inventor:-*  
*John Gabel*  
*by:- Peirce & Fisher*  
*Attys:-*





J. GABEL.  
 AUTOMATIC TALKING MACHINE.  
 APPLICATION FILED FEB. 26, 1906.

1.134,603.

Patented Apr. 6, 1915.  
 9 SHEETS—SHEET 8.

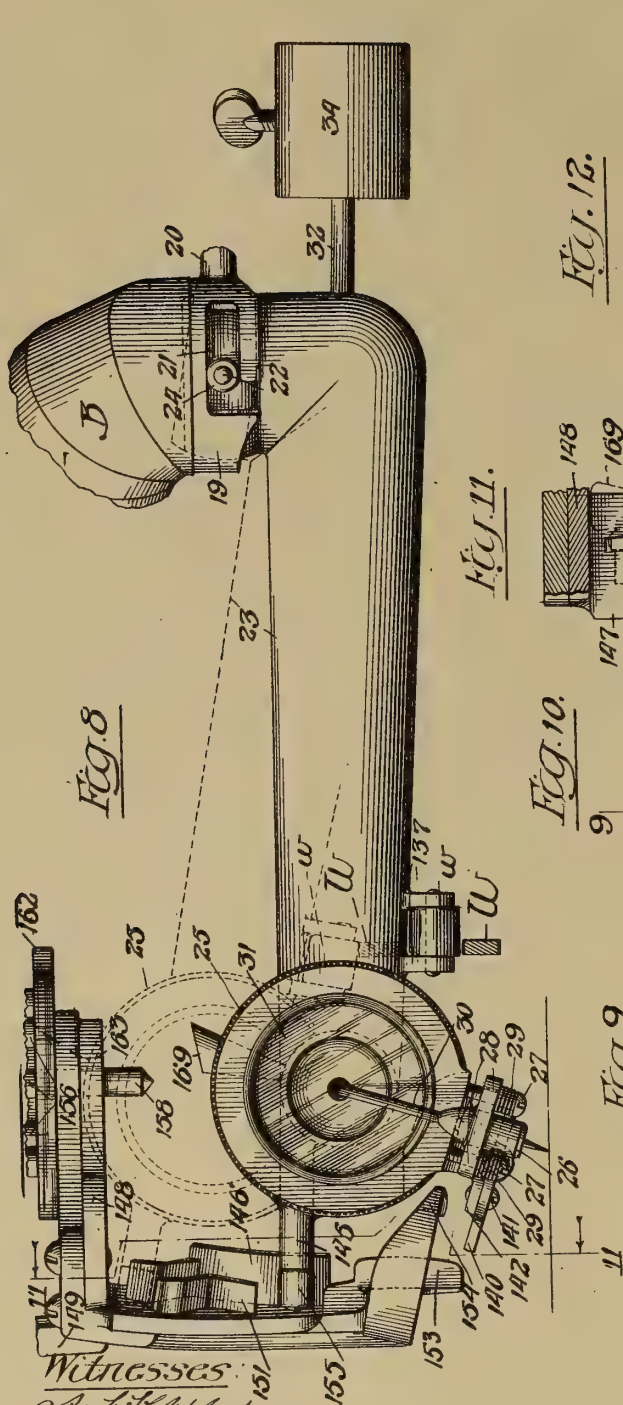


Fig. 8

Witnesses:  
 John H. Whitehead  
 William Purcell

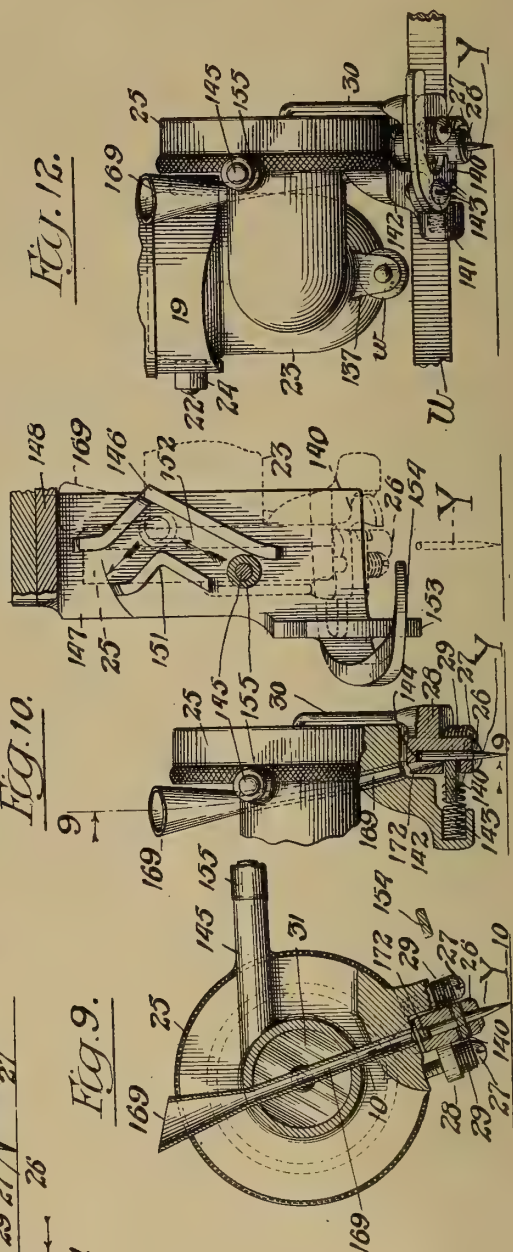


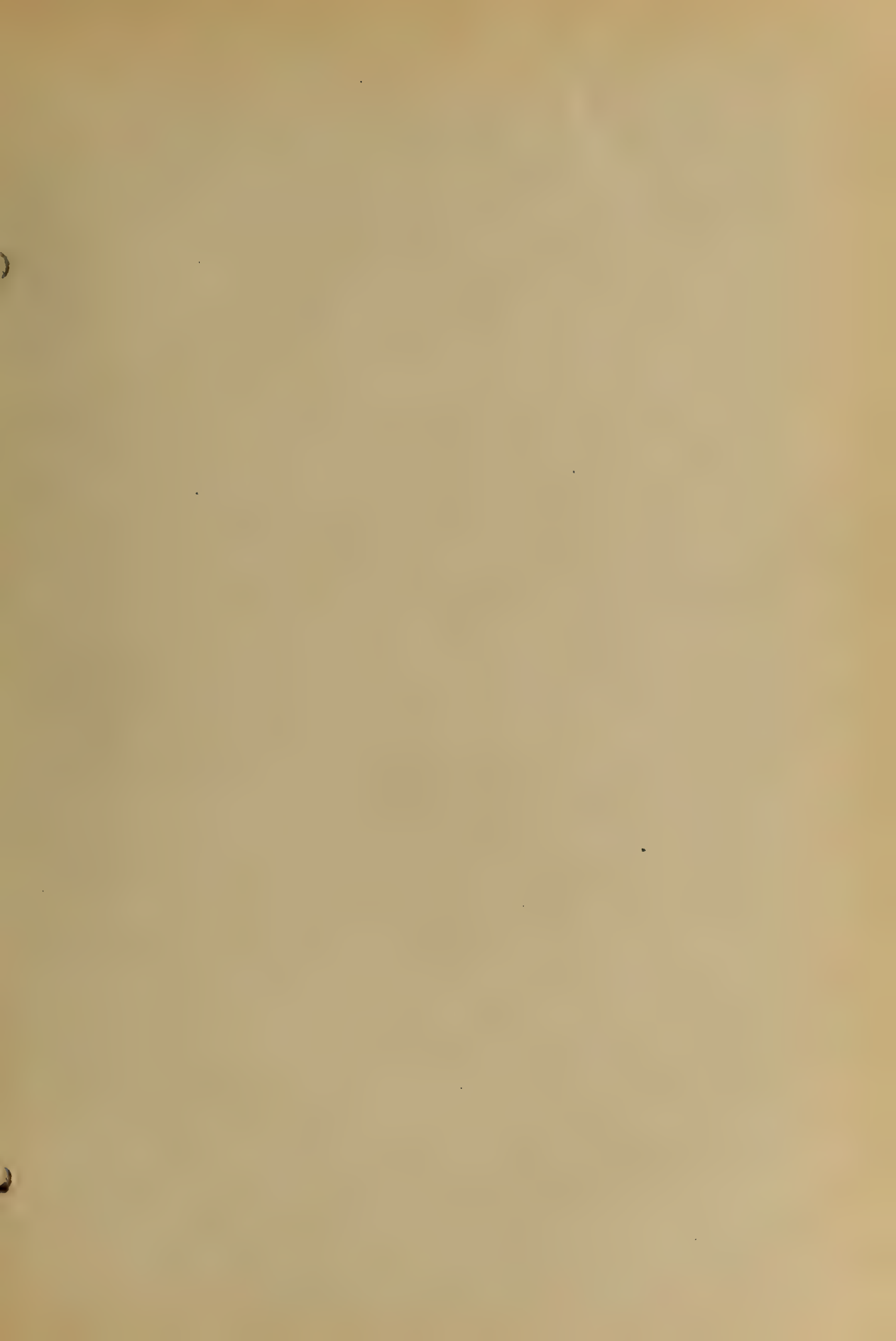
Fig. 12.

Fig. 10.

Fig. 11.

Fig. 9.

Inventor:  
 John Gabel  
 By: *Prince & Fisher*  
 Attys.



J. GABEL.  
 AUTOMATIC TALKING MACHINE.  
 APPLICATION FILED FEB. 26, 1906.

1,134,603.

Patented Apr. 6, 1915.  
 9 SHEETS—SHEET 9.

Fig. 13.

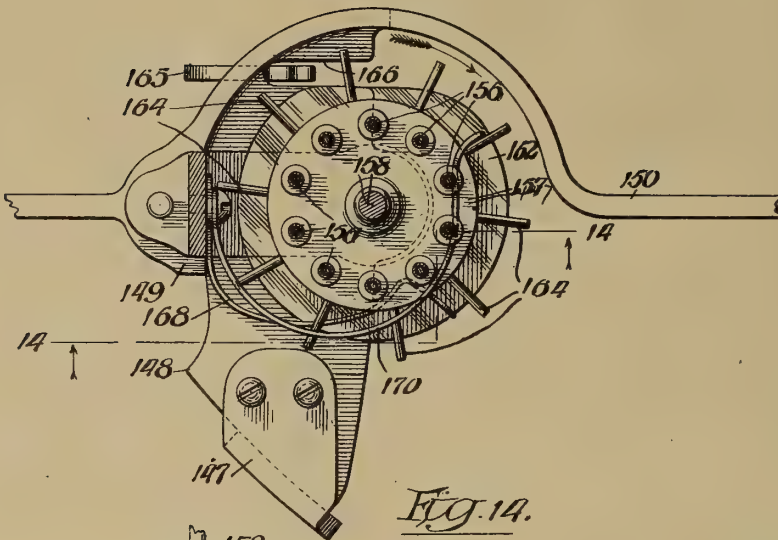
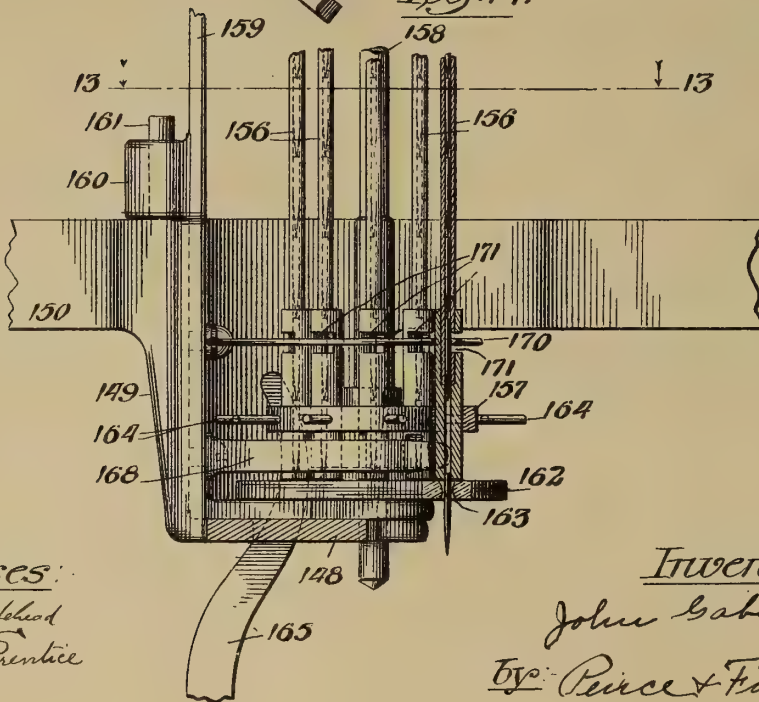


Fig. 14.



Witnesses:  
*Louis M. Whitelock*  
*Ellen Prentice*

Inventor:  
*John Gabel*  
By: *Prince & Fisher*  
Attys



# UNITED STATES PATENT OFFICE.

JOHN GABEL, OF CHICAGO, ILLINOIS.

AUTOMATIC TALKING-MACHINE.

1,134,603.

Specification of Letters Patent.

Patented Apr. 6, 1915.

Application filed February 26, 1906. Serial No. 302,878.

*To all whom it may concern:*

Be it known that I, JOHN GABEL, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Automatic Talking-Machines, of which the following is declared to be a full, clear, and exact description.

The invention relates to talking or sound-reproducing machines and seeks to provide, preferably in machines of the disk record type, automatic mechanism for changing the records or disks and for shifting the sound-box or reproducer into position to commence the reproduction of the record.

Further objects are to provide mechanism for automatically changing the sound-box needle or stylus; to provide means for automatically bringing a number of disks or records into operation, together with means whereby any particular record may be selected as desired by the user of the machine; to provide operating means for the automatic mechanism that may be coin-controlled so that all of the parts of the machine may be arranged within a suitable inclosing casing and to provide means for preventing the operation of the automatic mechanism when the talking machine is reproducing a record.

With these and other objects in view, the invention consists in the features of construction, and combinations of parts herein-after set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a front elevation of the improved machine as arranged within an inclosing casing. Fig. 2 is a plan view thereof with the casing and other parts shown in section on the line 2—2 of Figs. 1 and 3. Fig. 3 is a rear elevation of the operating mechanism with the casing in section. Fig. 4 is an enlarged detail plan view of a portion of the operating mechanism, certain parts being in section on the line 4—4 of Fig. 3. Fig. 5 is a partial front view of the parts shown in Figs. 3 and 4. Fig. 6 is a front elevation of parts of the operating mechanism and with certain parts shown in section on line 6—6 of Fig. 4. Fig. 7 is a side elevation of the parts shown in Figs. 5 and 6 and with the machine frame in section. Fig. 8 is a side elevation of the sound-box or reproducer, its supporting

arms and means for controlling its shift. Fig. 9 is a detail elevation showing the side of the sound-box opposite to that shown in Fig. 8 and with certain parts in section on line 9—9 of Fig. 10. Fig. 10 is a front view of the sound-box with parts in section on the line 10—10 of Fig. 9. Fig. 11 is a face view of the cam plate that controls the shift of the sound-box, parts being shown in section on line 11—11 of Fig. 8. Fig. 12 is a front view of the sound-box and its supporting arm. Fig. 13 is a horizontal section through the needle carrier or magazine taken on the line 13—13 of Fig. 14. Fig. 14 is a front elevation of the lower portion of the needle magazine with certain parts shown in section on the line 14—14 of Fig. 13.

To prevent improper interference with the machine and its operating mechanism, all parts are inclosed within a suitable upright casing A that is rectangular in section, as shown in Fig. 2, and that is provided with a removable back portion *a* to afford access to the mechanism. The front and sides of the casing may be provided with glazed openings 1 through which the operation of the mechanism may be viewed. The casing is mounted on feet 2 and the amplifying horn B on the machine extends through the top of the casing at one side thereof, with its bell or mouth *b* opening at the front. The operating parts are carried within the casing upon a frame consisting of a number of upright bars 3 that are connected by a number of horizontal longitudinally extending bars 4 (see Fig. 3) and by horizontal cross bars 5 (see Fig. 2). These bars are of metal and are securely connected to form a rigid frame that is mounted within the casing upon a pair of supports 6 (see Fig. 3) and held therein against movement by lugs 7 on the side walls of the casing. The lugs 7 are preferably removably held in place by screws so that by removing the back of the casing and detaching the lugs, the frame work and parts carried thereby may be taken out for repairs and the like.

As stated, the machine is particularly adapted for use in connection with flat disk records, and for this purpose the horizontal, rotatable turn-table C for the disk records (see Figs. 2, 3, 5 and 7) is carried upon the upper end of a short vertical shaft 8 in the upper, central portion of the frame. The turn-table shaft and its operating

mechanism is mounted upon a supplemental rigid frame 9 (see Fig. 7) that is secured to the upper ends of the central uprights 3 of the main frame. The lower conical end of the turn-table shaft 8 is stepped within a suitable bearing upon an upright lug 10 of the supplemental frame 9, and its upper end projects through a cross bar of the frame and supports the turn-table C. The turn-table is driven preferably by a spring motor, the casing D of which is fixed to the rear cross bar of the frame 9. A coiled spring  $\delta$  within the casing is fastened at one end thereto and at its other end to a horizontal shaft 11 that extends through the casing and is journaled in the front and rear cross bars of the frame 9. A gear 12 loose on shaft 11 (see Figs. 5 and 7), is provided with a spring-held pawl 13 arranged to engage a ratchet wheel 14 that is fixed to the shaft so as to be driven thereby when the spring rotates the shaft 11 in one direction but permitting the spring to be wound up by rotating the shaft in the opposite direction without moving the gear 12. This gear meshes with the pinion 15 (see Figs. 3 and 7) that is carried upon a short, horizontal shaft 16 journaled in the supplemental frame 9 and arranged parallel with the motor shaft 11. A beveled gear 17 on the forward end of the shaft 16, meshes with the beveled pinion 18 on the lower end of the turn-table shaft 8. The turn-table is thus driven from the spring motor by the train of gearing described.

35 The amplifying horn B within the top of the casing A extends from the center of the casing outwardly toward one side thereof. At its outer end the horn is provided with an upturned elbow that projects through the top of the casing and connects with the bell or mouth piece  $\delta$ . At its inner end the horn is provided with a downturned elbow portion that is provided with a ring 19 having an off-set 20 (see Figs. 2 and 8) by which it is secured to one of the uprights 3 of the frame. The horizontal ring 19 is provided on opposite sides with a pair of horizontal slots 21 within which set pins 22 that are fixed to the outer upturned end or elbow portion of a hollow reproducer arm 23. The pins 22 are preferably provided with anti-friction rollers 24 that fit within the slots 21. At its inner end the arm 23 is provided with a horizontally turned elbow portion that carries an upright sound-box 25. A needle or stylus holder 26 is connected to the sound-box by two screws 27 that extend loosely through ears 28 on the stylus holder and are threaded into the sound-box. Springs 29 are coiled about the outer ends of the screws and interposed between the heads thereof and the ears 28 yieldingly hold the stylus support in position. The stylus support or holder 26 is provided with an arm

30 that is connected to the diaphragm 31 of the sound-box. At its outer end the hollow reproducer arm 23 is provided beyond its connection with the horn, with a rod 32 extending in line with the arm and carrying a counter-weight 34, which may, if desired, be adjustably mounted on the rod 32. The sound-box and reproducer arm are moved over the surface of the disk records on the turn-table C in the usual manner by the engagement of a needle or stylus thereof with the spiral record groove of the disk. During this movement of the arm the pins 22 thereof move in the horizontal slots 21 of the ring 19 on the end of the amplifying horn. At the same time the arm is free to swing vertically upon the pins to allow for any irregularity in the record or in the movement thereof. The weight of the reproducer arm and parts carried thereby are nearly counter-balanced by the weight 34 so that the needle will not bear with too great pressure on the disk. At one end the horizontal slots 21 of the ring 19 are open so that the reproducer arm may be readily connected and disconnected from the horn. It will be understood in the ordinary travel of the arm, the pins 22 will not come opposite the open ends of the slots. As indicated in Figs. 8 and 12, that portion of the elbow on the outer end of the arm 23 that projects within the ring 19 in the horn, is in the form of a head having a surface which constitutes a segment of a sphere so that a sound-tight joint between the arm and horn will be maintained in spite of the universal movement of the arm with reference to the ring.

The speed of the turn-table and the disk record supported thereby is controlled by a suitable centrifugal governor that comprises, in the form shown, weights E (see Fig. 7) mounted centrally on bowed springs 35 that are fixed at their ends to lower and upper collars 36 and 37 that are mounted upon a vertical governor shaft  $e$ . This shaft is journaled at its upper and lower ends in the supplemental motor frame 9 and the upper end of the shaft is provided with a pinion 38 meshing with a gear 39 on the short turn-table shaft 8. The collars 36 and 37 have expanded friction disk portions and the lower collar 36 is fixed to the shaft while the upper one is loosely mounted thereon. An arm 40 is pivoted at its forward end to the end of a lug 41 on the forward part of the motor frame 9. The rear end of this frame is forked (see Fig. 5) and provided with pads of felt or like material arranged to engage the friction disk or collar 37. A screw 42 threaded through the lug 41 engages the arm or lever 40 and adjusts its position to thereby vary the speed of the turn-table. In operation, the weights E fly outwardly and draw the disk 37 down upon the end of



the arm 40 so as to check the rotation of the turn-table C and compel it to rotate at a uniform rate of speed.

The motor shaft 11 is provided on its forward end with a small sprocket wheel 43 (see Figs. 3, 5 and 7). A chain 44 passes over this wheel and over a large sprocket wheel 45 mounted on a shaft F. Shaft F is journaled in suitable bearings on the horizontal bars 4 at the lower end of the frame, and its forward end projects through the front of the casing A and is provided with a crank handle *f* (see Fig. 1). The sprocket chain 44 (see Fig. 7) is provided at one point with a horizontal projecting stud 46 that is arranged to engage and lift an arm or lever 47 that is pivotally connected by a stud 48 to the motor frame 9 and projects laterally beneath the governor arm 40 so that the latter is lifted with the arm 47 and its inner end pressed firmly into engagement with the governor disk 37 to stop the operation of the turn-table C. The pin or stud 46 on the chain 44 is so positioned that it will engage the arm 47 to lift it and the governor arm 40 and thereby stop the rotation of the disk C; after the latter has been driven for a sufficient length of time to reproduce the sound record thereon. It will be understood that the sprocket wheels 43 and 45 and sprocket chain 44 are moved in one direction to wind up the motor spring *d*, and are driven by the spring in the opposite direction, while the turn-table is rotated to reproduce a record thereon. By this arrangement when the large wheel 45 is turned in one direction to wind up the motor, the pin 46 on the chain 44 will be moved away from the arm 47 and the inner end of the governor arm 40 will move away from the disk 37 so that the turn-table may rotate. During the rotation of the turn-table, the chain is driven in the opposite direction and as soon as the pin 46 thereon engages and lifts arms 47 and 40, the operation of the motor and turn-table will be arrested. When the pin 46 moves from under the arm 47 the latter is lowered until a forwardly projecting off-set stud 49 thereon (see Figs. 6 and 7) comes into engagement with the front bar of the motor frame 9. Although the large sprocket wheel 45 thus rotates in opposite directions, the winding shaft F rotates only in one direction and the wheel 45 is therefore loosely mounted on the shaft. A ratchet wheel 50 (see Fig. 5) fixed to the shaft F in front of the sprocket wheel 45, carries a pivoted pawl or dog 51. A spring 52 connected to the ratchet disk and to the pawl is arranged to shift and hold the latter in line with the lug 53 fixed to and projecting forwardly from one of the arms of the sprocket wheel 45. The tail of the pawl 51 extends opposite a notch 54 in the periphery of the

ratchet disk 50, and, in the normal position of the ratchet wheel or disk 50, a trip pawl or dog 55 projects within the notch 54. This pawl is pivotally mounted on the frame and a spring 56 extends between the frame and a lug 57 on the pawl and tends to project it within the slot 54. The end of the trip pawl 55 is wide enough to engage the notch 54 in the ratchet disk 50 and to also engage the tail of the pawl 51, and spring 56 of the trip pawl or dog 55 is stronger than the spring 52 of the pawl or dog 51 so that the latter is normally held in the position shown in Fig. 5, against the tension of its spring 52 and out of line with the lug 53 on the sprocket wheel 45. When the pawl 55 is in the notch 54 the ratchet disk 50, shaft F and winding handle *f* are locked. Suitable means are provided for lifting the dog or pawl 55, and when this is done shaft F is unlocked and spring 52 moves the dog or pawl 51 into line with the lug 53 on the sprocket wheel 45. Then by turning the handle, the dog 51 on the ratchet wheel may be brought into engagement with the lug 53 to turn the sprocket wheel and wind up the spring motor. The parts are so positioned that, when dog 51 engages the lug 53 the locking pawl 55 will engage the teeth of the ratchet 50 and will prevent the return movement thereof. It will also prevent the return movement of the sprocket wheel 45 and of the motor shaft 11 until shaft F and ratchet disk 50 have been moved through a complete revolution and brought the notch 54 of the disk again beneath the end of the pawl 55. When this occurs, dog 55 will drop into the notch 54, lock the ratchet wheel and shaft F and will engage the tail of the pawl 51 to trip it out of engagement with the lug 53 on the sprocket wheel 45. The latter wheel and the motor shaft are then free to be driven by the spring motor in the opposite direction as disk C is rotated in reproducing the record thereon. By this arrangement the user of the machine is compelled to completely wind up the motor before it can operate to rotate the turn-table and at the same time he is prevented from overwinding the motor. The end of a stiff leaf spring 58 fixed to the frame is arranged to engage a pin 59 on the face of the ratchet disk as it approaches the end of a single revolution, and as the pin snaps by the end of the spring 58 the movement of the ratchet wheel is checked so that the locking disk or pawl 55 will invariably drop into the notch 54 of the ratchet wheel to check its forward movement and lock it after it has made a single revolution. Pawl or dog 55 is preferably shifted out of the notch 54 by a coin-controlled mechanism comprising a pair of levers or arms 60 and 61 that are pivotally mounted on the frame on opposite sides of



a suitable coin chute 62 that leads from a slot 63 (see Fig. 1) in the front of the machine casing. The lever or arm 61 is provided on its end with an off-set lug 64 that projects through a transverse slot in the coin chute. A spring 65 connected to the arm normally holds the lug 64 in position to engage and arrest the inserted coin as indicated in dotted lines in Fig. 5. The lever or arm 60 is provided on its end with an off-set lug 66 that projects through a transverse slot in the coin chute and is normally held in a position above the coin when the latter is arrested by the lug 64 on the arm 61. A lever or arm 67 pivoted between its ends to the frame below the pivot of the arm 60 is connected at one end to the arm 60 by a coiled spring 68. A link 69 pivoted to the arm 60 is provided with a V-shaped end arranged to engage and rock within a correspondingly shaped bearing in the edge of the arm 67. Link 69 holds the arms 60 and 67 properly spaced apart and spring 68 holds the arm or lever 67 into engagement with the end of the link 69. The opposite end of the arm or lever 67 is provided with a cam portion 70 that is normally arranged adjacent a pin 71 on the ratchet disk 50. A projecting arm 72 on the pawl 55 is connected by a link or rod 73 to the lower end of the arm or lever 61.

It will be noted that the notch 54 of the ratchet disk 50 is somewhat larger than the end of the locking pawl 55 so that a slight initial movement may be given to the ratchet wheel by turning the handle *f* of the shaft F. By this slight initial movement the pin 71 on the ratchet disk will press upon the cam portion 70 of the arm or lever 67 and turn the latter together with the arm or lever 60. If a coin has been inserted and arrested between lugs 64 and 66 on the levers 61 and 60, this movement of the lever 60 will shift the arm 61 so that the latter, through the medium of the connecting rod or link 73, will lift locking pawl 55 from the notch 54 of the ratchet disk so as to permit the continued forward movement of the shaft F. As the ratchet disk 50 is turned, a segmental ledge 74 thereon will be brought into engagement with the end of the arm 67 so that the parts actuated thereby will be held in shifted position until the pawl 55 is brought into engagement with the teeth of the ratchet disk 50. The lugs 66 and 64 on the levers 60 and 61 are so positioned that, during the movement described, the coin will be pushed past the lug 64 down into the casing of the machine. By providing a yielding spring connection 68 between the levers 67 and 60, it is impossible to break the parts should the coin become stuck in the chute.

The lever 67 is connected by a link or rod 75 and a coiled spring 76 to the lug 49 on

the end of the lever or arm 47. In the normal stationary position of the parts as stated, this arm is upheld by the pin 46 on the chain 44 and through the medium of the spring 76 and rod 75 the levers 67 and 60 are also upheld with the end of the lever 67 in engagement with the pin 71 on the ratchet disk 50 and with the lug 66 on the lever 60 in its uppermost position indicated in the drawings. When the motor is wound up, pin 46 is moved from beneath arm 47 so that the latter drops down until the lug 49 thereon engages one of the cross bars of the frame. This also lowers the levers or arms 60 and 67 so that the lug 66 on the lever 60 is positioned in the center of the coin chute, and it is possible for the coin to drop in place between the lug 66 and the lug 64 on the arm 61. By this arrangement, it is impossible to release the winding mechanism until the motor has operated a sufficient length of time to reproduce the entire record on the turn-table, but when the pin 46 again engages the arm 47 to arrest the motor, as described, lever arms 60 and 67 will be lifted and lug 66 on arm 60 moved back to its normal position indicated so that the winding mechanism may be again released.

The disk records G are preferably carried by two magazines or holders arranged on opposite sides of the turn-table C. In the form shown, each magazine or holder (see Figs. 2, 3 and 5) comprises a frame H mounted to slide on a pair of vertical rods 77 that are fixed at their ends to the metal frame work of the machine. Each holder frame H is provided with a vertical series of inwardly projecting horizontal rods *h* that are arranged in pairs and upon which the separate disk records G are supported. The disk records are provided with the usual center openings and through the central openings or holes of the set of disks on each holder or magazine, extends a pair of fixed vertical pins 78 and 79. The lowermost pin is fixed to a cross piece 80 of the machine frame and the uppermost pin is connected to a cross piece 81. The adjacent ends of these pins are spaced apart as shown, at a point in line with the turn-table C. The pins 78 and 79 prevent the displacement of all of the records G from the holder or magazine, except the record that is opposite the space between the ends of the pins and opposite the turn-table C. The uppermost pin 79 of each pair is however (see Fig. 5) threaded into the cross bar 81 and is provided with a cross pin or handle 82 by which it may be unscrewed and removed from place so that when the back of the machine is open the disk records may be changed as desired.

Suitable means are provided for shifting the holders or magazines to bring any one



disk opposite the space between the pins 78 and 79 so that it may be shifted from the holder or magazine onto the turn-table. Such means preferably comprises a pair of arms J (see Figs. 3, 4 and 6) that are pivotally mounted at their inner ends on a stud 83 fixed to a supplemental motor frame 84 that is suitably connected to the main frame beneath the main motor frame 9. The arms J extend in opposite directions from the stud 83 and are provided on their ends with rollers *j* that engage inwardly projecting arms 85 fixed to the lower ends of the magazine or holder frames H. Each arm is provided with a beveled pawl 86 that engages a stepped heart-shaped, shifter cam K. The cams K are mounted upon a pair of horizontal shafts *k* that are suitably journaled in the supplemental motor frame 84 and the forward ends thereof project through the front of the machine casing and are provided with turning knobs 87, as shown in Fig. 1. The arms J and record magazines or holders are supported in normal position by the cams K. By rotating the cams the magazines may be raised and lowered step-by-step to bring the records opposite the turn-table. Each arm J is guided between a pair of pins *j'* fixed to the frame (see Figs. 3 and 4).

The magazines are each provided with a pointer 88 (see Figs. 1 and 2) that cooperates with a printed or written list within a frame 89 that is fixed to the machine frame. The list of course, contains the names of the several records of the adjacent magazine or holder and are arranged in corresponding proper order so that the user of the machine may bring the desired record or disk into position at the space between the holding pins 78 and 79 and opposite the turn-table C. The lists within the frames 89 and the ends of the pointers 88 are visible, as shown in Fig. 1, through the front glazed opening in the upper part of the machine casing.

Each record magazine or holder is preferably counter-balanced by a weight L (see Fig. 3) connected to the lower end of a wire cord 90 that extends over a guide pulley 91 at the top of the machine frame, and is connected at its other end to a lug 92 on the upper end of the magazine or holder frame H. The counter-weights L are preferably arranged within guide sleeves or tubes *l* that are fixed to the frame.

The disk records are transferred to and from the holders or magazines by a reciprocating shifter or carriage M that is mounted to slide back and forth in the plane of the turn-table C (see Figs. 2, 3, 5 and 7). The shifter or carriage comprises a central brace bar *m* and side bars *m'* fixed to the end of the central brace piece, as most clearly shown in Fig. 2. The carriage or shifter

is mounted to slide (see Figs. 5 and 7) on rollers 93 mounted on two of the horizontal bars 4 at the front and rear of the frame. Pins 94 (see Fig. 2) fixed to the vertical bars at the front and rear of the frame, are arranged to project over the side bars *m'* of the carriage to prevent the displacement thereof. A pair of arms 95 (see Figs. 2 and 7) pivoted to the horizontal frame bars 4 at the front and rear of the frame, carry rollers 96 that are yieldingly pressed by springs 97 connected to the arms into engagement with the upper edges of the side bars *m'* of the carriage or shifter. The ends of the side bars *m'* of the shifter or carriage are bent inwardly (see Figs. 2 and 7) to engage the record disks G and the carriage is of such length that it will engage the disk upon the central turn-table and a disk upon one of the holders or magazines, the disk on the turn-table being located between the central bar *m* and one end of the carriage, while the disk on the holder is between the central bar *m* and the other end of the carriage. When the carriage or shifter is moved from one extreme position to the other, it will shift the record on the turn-table into one holder and move one of the disks on the other holder on to the turn-table. For example, if the shifter is moved from its left hand position shown in Fig. 2 toward the right, the disk on the turn-table will be moved into the right hand holder or magazine and the disk record on the left hand holder that is opposite the turn-table and between the left hand pins 79 and 78, will be shifted on to the turn-table. The end portions of the carriage or shifter do not in its movement pass over the turn-table C, but the central portion *m* thereof, which passes over the turn-table from one side to the other as the carriage is shifted, is arranged to just clear the turn-table but to engage the edge of the disk thereon. To insure that this central bar *m* shall engage the edge of the disk, it is provided with upwardly projecting inclined ribs 98 (see Fig. 2). The disk upon the turn-table is accurately centered thereon, as hereinafter described, and is thus held out of engagement with the sides of the carriage or shifter so that the latter does not interfere with the rotation thereof. The carriage moreover, does not interfere with the vertical shift of the magazine holders or carriers. In the drawings, the carriage or shifter is shown as in its left hand position so that it securely holds the disk thereon that is between the pins 78 and 79 against displacement, but this holder can be shifted vertically to bring any one of the disks thereon into position between the arms or side bars of the carriage. The adjacent ends of the pins 78 and 79 are pointed, as shown, so that they may accurately engage the central openings of the



disks as the disk holders are shifted. The disk supporting pins *h* are also pointed so that the disk will properly engage therewith as they are shifted back and forth by the carriage. As shown in Figs. 3 and 5, the roller 96 that engage the upper edges of the side bars *m'* of the carriage or disk shifter are located in line with the center of the turn-table C and that the rollers 93 that engage the lower edges of the side bars *m'* are positioned at equal distances on opposite sides of the rollers 96 so that the end of the carriage that is innermost and adjacent the turn-table will be securely held against vertical shift.

The central portion *m* of the carriage is provided at its rear end with a horizontal pin or roller 99 fixed to a lug 100 depending therefrom. The upper forked end of a shifter arm N engages the pin or roller 99 (see Fig. 2). At its lower end arm N is connected by a pivot bolt or stud 101 to the lower portion of the machine frame. The shifter arm N is driven from a short shaft 102 that is journaled (see Figs. 3, 4, 6 and 7), in the supplemental motor frame 84. At its rear end the shaft is provided with a crank arm 103 that carries a pin 104 projecting within a cam slot *n* in the shifter arm N (see Fig. 3). At each operation of the machine the shaft 102 is given a half revolution and operates to throw the shifter arm from one side to the other. The lower portion of the cam slot *n* is loop-shaped and divided by a rib 105, while the upper portion of the slot is inclined. When looking at the machine from the rear, as shown in Fig. 5, the pin 104 moves through the lower part of the slot in moving the shifter arm from right to left and through the upper part of the cam slot in moving the arm from left to right. By the peculiar arrangement of the cam slot, the carriage is started and brought to rest slowly and easily and without shock or jar. Pin 104 is preferably provided with a roller that sets within the cam slot *n*.

A drum O (see Figs. 6 and 7) is loosely mounted on the front end of the short shaft 102. A steel tape *p* passes over the drum and is fixed thereto at one end. The other end of the tape is secured to the free end of a shift lever P that is pivotally mounted on a stud 106 at one side of the lower portion of the machine frame. The shifter arm P extends over the shaft F and is provided with a pin 107 that engages a spiral cam 108 fixed to the shaft. A heavy spring *p'* is connected to the arm and to the bottom of the inclosing casing and holds the pin 107 in engagement with the cam 108. Pin 107 is preferably provided with an anti-friction roller. Drum O is provided at its rear edge with a ratchet 109 arranged to engage a pivoted spring-held pawl 110 on a gear 111

that is fixed to the shaft 102. Gear 111 (see Fig. 4) meshes with a small pinion 112 on the rear end of a short shaft 113 that is journaled in the supplemental frame 84. A gear 114 on the front end of the shaft 113 meshes with a pinion 115 on a short shaft *r* that is suitably journaled in the supplemental frame 84 and carries a governing fan R. Fan R is normally engaged by a horizontal pin *s* that is fixed to and projects horizontally and forwardly from a bar S that is held in vertical position by screws 116 (see Figs. 6 and 7) passing through vertical slots therein. Bar S may thus move vertically to an extent limited by the length of the slots. A coiled spring 117 connected to the bar normally holds it in lowermost position with the pin *s* thereon in engagement with the governor fan R. Bar S constitutes a stop device for controlling the operation of the shaft 102 that operates the carriage shifter N. The upper end of the bar is off-set rearwardly (see Fig. 7) and carries a pivoted dog *s'*, the upper end of which is connected to the bar S by a coiled spring 118. The gear 111 is provided on one face with a projecting rib 119 of substantially circular form (see Fig. 6). This rib is provided at diametrically opposite points with notches 120 within one of which the dog *s'* normally extends. The motor spring *p'* that is connected to the arm P, tends to turn the gear 111 in anti-clockwise direction, when viewed from the front of the machine as in Fig. 6, and the dog *s'* is normally held in the position shown in Fig. 6 with its spring 118 under tension. The lower end of the stop device or bar S is turned rearwardly and projects in line with the path of movement of the arm P.

The drum O, as stated, is loosely mounted on the shaft and as the shaft F is turned thereon a single revolution the arm P will be lifted by the cam 108 on the shaft, thus winding up or placing the motor spring *p'* under tension. During this vertical movement of the arm P, the steel tape *p* is stiff enough to turn the drum O loosely on the shaft 102, the ratchet teeth 109 of the drum passing idly beneath the pawl 110 on the gear 111. At the end of its upward movement, arm P engages the lower end of the stop bar S and shifts it vertically against the tension of the spring 117. This movement of the bar S lifts the pin *s* thereon out of engagement with the fan governor R and also lifts the dog *s'* out of the notch 120 in the circular rib 119 of the gear 111. When the dog *s'* clears the notch 120 its spring 118 shifts it so that, when the arm P again swings downwardly the dog will engage the circular rib 119 and hold the stop bar S up so as to prevent the pin *s* thereon from dropping into engagement with the governing fan R. Arm P is drawn down by the motor



spring  $p'$  as soon as the pin 107 thereon clears the shoulder of the spiral cam 108 on the shaft F. This is effected just as the winding shaft F reaches the end of its revolution. Motor spring  $p'$  then draws down arm P and through the strap  $p$ , drum O, ratchet 109 and pawl 110 turns the shaft 102 so that the latter moves the carriage shifter arm N and the carriage or record shifter is then operated to remove the record on the turn-table and place another record thereon. At the end of a half revolution of the shaft 102 which, as stated, is sufficient to move the carriage or record shifter from one side to the other, the dog  $s'$  on the stop bar S is drawn down by the spring 117 of the stop bar S into the other notch 120 of the rib 119, and the pin  $s$  engages the governor fan R so that the shaft 102 and parts operated thereby, are arrested. The rib 119 is provided just in front of the notches 120 (see Fig. 6) with depressed portions 121 in advance of the notches 120 to lower the dog  $s'$  and bar S slightly before dog  $s'$  drops into the notches. By this arrangement, the motor shaft 102 that operates the carriage or record shifter, is brought into operation and automatically arrested after it has completed a half revolution. The fan governor 30 compels the even uniform operation of the shaft 102 under the influence of the motor spring  $p'$ , and as stated the cam slot  $n$  and shifter arm N is so shaped that the record shifter and records are brought to rest 35 slowly and without shock or jar.

It is desirable to prevent the operation of the turn-table C until after the record shifter has completed its movement. To effect this, the stop bar S is provided on its end with a laterally projecting spring strip 122 that carries a friction button 123 covered with felt or like material. As stated, the stop bar S is held in uppermost position during the movement of the record shifter since the dog  $s'$  thereon rides upon the rib 119. When in this uppermost position, the friction button 123 engages the disk 36 on the lower end of the governor shaft E and thus prevents the operation of the turn-table motor until after the record shifter has completed its movement.

It will be noted that the records are shifted by the carriage onto the turn-table alternately from the record holders or magazines on opposite sides thereof, and that when a record is shifted from one of the holders, the record on the turn-table is moved back into the other holder. When the carriage is shifted from left to right, a record in the left hand holder is moved onto the table and the record on the table is moved back into the right hand holder and when the carriage is shifted from right to left, a disk on the right hand holder is moved on the table and the disk on the table is

moved into the left hand holder. Thus in both positions of the carriage one of the magazines is full of records while one record has been removed from the other magazine. It is necessary to prevent the vertical movement of the magazine from which a record has been removed, so that the record may be properly replaced therein by the movement of the carriage. It is also desirable to provide means for automatically shifting the magazines vertically to bring the disks successively opposite the turn-table and into engagement with the carriage or shifter. For these purposes, the shafts  $k$  that carry the cams K for vertically shifting the record magazines, are provided on their rear ends with toothed locking wheels T (see Figs. 3 and 4). The spaces between the teeth of these wheels are semi-circular in outline and are arranged to be engaged by pins or rollers 124 on the outer ends of a pair of pawls or arms  $t$ . These arms are pivotally mounted at their inner adjacent ends upon an upright portion or lug 125 of the supplemental frame 84. A leaf spring 126 fixed centrally to the lug 125, engages and depresses the pawls or arms  $t$ . When the pins or rollers 124 on the pawls  $t$  are down in the bottoms of the slots between the teeth of the wheels T, these wheels and the shafts  $k$  are locked so that the latter cannot be rotated to shift the magazines. The pawls  $t$  are provided with rearwardly projecting pins 127 which are arranged to be engaged by a lug 128 on the forward side of the shifter arm N. When the pin on one of the arms is engaged by the lug 128, the arm will be held in such position that the pin or roller thereon will only project slightly within one of the notches of the corresponding wheel T, as shown at the right hand in Fig. 3. The ends of the teeth of the wheels T are inclined and while, in its slightly raised position, the small arm  $t$  will prevent the rotation of the corresponding wheel in one direction, it will permit its rotation in the direction indicated by the arrow in Fig. 3, so that the user of the machine may move the magazine or holder at the right in Fig. 3 to bring any disk thereon into engagement with the disk shifter by turning the thumb button 87 of the corresponding shaft. The record holder or magazine at the left of Fig. 3, from which the record on the table has been removed, is locked against movement so that at the next operation of the machine it will be in proper position to receive the record on the table. When the arm N is shifted to move a disk from the magazine at the right in Fig. 3 onto the table, the lug 128 on the arm will move out from beneath the pin 127 on the right hand locking pawl so that the latter will lock the operating shaft and magazine on that side, and it will stay locked until the record has been returned to



the holder. The movement of the arm carries the disk on the table back into the magazine at the left in Fig. 3, and at the end of its movement lug 128 on the arm will engage the pin 127 of the left hand locking pawl *t* so as to release the shaft *k* and the magazine operated thereby on that side. In this way the magazines or holders on opposite sides of the turn-table are alternately locked and unlocked as the record shifter or carriage is moved. When the carriage is at either end of its movement, the magazine at that end is unlocked so that the user may select the next disk that is to be moved onto the table at the next operation of the machine. The magazine or holder at the opposite side of the machine is however locked until the disk that has been removed therefrom is returned by the movement of the disk shifter. It will also be noted that while the shifter arm and carriage are moving, both of the shafts *k* are locked against movement and neither of the magazines can be shifted.

For automatically shifting the magazines the crank arm 103 on the shaft 102 is provided at its end with a tooth *t'* (see Fig. 3). The cam slot *n* in the arm *N* is so shaped that, as stated, the arm and carriage are brought to rest slowly. It is also so shaped that the arm *N* and carriage reach the end of their movement before the crank arm 103 reaches the end of its movement. So that as the arm 103 and shifter arm *N* move to one side of the machine, the lug 128 at the end of the movement of the arm *N* first lifts the locking pawl *t* to release the wheel *T* and shaft *k* on that side and subsequently the tooth *t'* on the arm 103 at the end of the movement of said arm is brought into engagement with one of the teeth of the wheel *T*, so that it and the shaft *k* is advanced one notch to move the corresponding magazine and shift another disk into engagement with the disk shifter and opposite the turn-table *C*. By this arrangement, if the shafts *k* are not turned by the users of the machine, a different record will be placed on the turn-table at each operation of the machine until all of the records have been successively reproduced. This automatic operation however, does not prevent the user of the machine from selecting any record in the magazine that is unlocked.

The record on the turn-table *C* is held in proper position thereon by a centering device *V* (see Figs. 2 and 7) that has a conical roller on its lower end arranged to extend through the central opening of the disk and into the recess of the central portion of the turn-table *C*. The centering device is carried upon the end of a forwardly extending, horizontal portion 129 of a vertically reciprocating shifter-bar *v*. This bar is mounted at the rear of the machine frame, its lower end being connected to the frame and guided

by a screw 130 extending through a vertical slot therein. The upper end of the bar is arranged to slide through a U-shaped strap 131 fixed to one of the horizontal bars on the machine frame. The shifter *V* is raised and lowered to release and clamp the disks upon the turn-table by a spiral cam 132 (see Figs. 3 and 4) that is mounted upon the rear end of a horizontal shaft 133 journaled in the machine frame. The inner end of the shaft is provided with a gear 134 meshing with the gear 111 on the motor shaft 102. As stated, motor shaft 102 is given a half-revolution to operate the disk shifter. Gear 134 is exactly one-half the size of gear 111 so that it is given a complete revolution to first raise the centering device and release the record on the turn-table, and then to permit the downward shift thereof to engage and hold the new disk that is placed on the table. The lower end of the shifter rod is preferably V-shaped and sets within a correspondingly shaped notch in the cam 132 in the normal position of the parts so that the centering device is accurately held in its proper position. The shifter arm *v* also serves to move the reproducer arm to the outer periphery of the disk on the turn-table to commence the reproduction thereof and the shifter arm also operates the needle changing mechanism. For these purposes a segmental track-bar *W* (see Figs. 2 and 5), is pivotally connected at one end by a stud 135 to the frame of the machine opposite the center of the turn-table. The other end of the track-bar *W* is pivoted to a lug 136 on the side of the horizontal portion 129 of the shifter rod *v*. The track-bar *W* is concentric with the center of motion of the hollow reproducer arm 23 and the latter is provided on its under side with a roller *w* (see Fig. 8) journaled between a pair of lugs 137. In the normal, horizontal position of the track-bar *W* and with the needle of the reproducer arm resting upon the disk, the roller *w* is above the track-bar *W* but out of engagement therewith. When the reproducer arm is in its innermost position the vertical shift of the rod *v* will raise the inner end of the track bar *W* and the latter will engage the roller *w* and lift the reproducer arm. The track bar *W* is then in inclined position so that the reproducer arm may slide down the same until the roller *w* engages a lug 138 at the outer end of the track bar. A light spring 139 (see Fig. 5) on the track bar is arranged to engage the roller *w* when the latter hits the lug 138 to prevent any rebound of the reproducer arm.

The needle or stylus *Y* (see Figs. 8 to 12) is arranged within the bore of the hollow cylindrical holder 26. A clamp 140 is connected by a pivot screw 141 to a lug 142 on the rear face of the sound box. This clamp is pivoted to swing in a plane at right angles



to the holder 26. A coiled spring 143 arranged in a socket in the end of the lug 142 engages the end of the clamp 140 and presses it through a transverse slot in the side of the cylindrical holder 26 into engagement with the needle or stylus Y to hold the latter firmly in place. The inner end of the needle abuts against the shoulder 144 (see Fig. 10) at the inner end of the bore of the holder 26.

The sound box is provided with a finger 145 that extends in line with the reproducer arm 23. After a record has been reproduced the sound box and arm 23 are brought to rest with the end of the finger 145 against the lower end of a V-shaped cam plate 146 on a bracket 147. This bracket (see Figs. 2 and 5) is arranged above the turn-table adjacent the central portion thereof. It is secured at its upper end and depends from the horizontal plate portion 148 of a bracket 149 (see Figs. 5, 8, 13 and 14). Bracket 149 is cast in one piece with the frame bar 150 that is suitably secured at its ends to the metal frame of the machine. The bracket 147 is provided with a second V-shaped cam plate 151 arranged adjacent and parallel to the cam plate 146 so as to form a zigzag cam slot or guide-way. Plate 151 (see Fig. 11) is shorter than plate 146 so that the pin 145 may pass beneath it into engagement with the lower end of the plate 146. Bracket 147 is also provided at its lower end and at one side with a vertical trip cam 153 and with a hook-shaped abutment or stop 154. The cam 153 is so placed that when the sound box and reproducer arm are lifted by the shifter rod *v* and rail W, it will engage the tail of clamp 140 and shift it against the tension of its spring 143 to release the needle and to permit it to fall from the holder 26. This partial raised position of the sound box is indicated by dotted lines in Fig. 11. When the reproducer arm and sound box are lifted, the end of the pin 145 will enter and pass through the V-shaped cam groove 152 and the reproducer arm and sound box will not slide down the rail W to the outer periphery of the record on the turn-table until after the pin 145 has passed out of the upper end of the slot. The end portion of the pin 145 that projects within the slot 152, is preferably provided with an anti-friction roller 155.

The stylus or needle magazine (see Figs. 1, 13 and 14) preferably comprises a circular series of vertical tubes 156 that are secured at their ends to and extend through a pair of upper and lower disks 157 mounted on a central shaft 158. Shaft 158 is journaled at its ends in the arms of a U-shaped holder 159. This holder is arranged to set at its lower end upon the plate portion 148 of the bracket 149. This bracket and the supporting frame bar 150 therefor, is

semi-circular in form (see Fig. 13) to receive the rotary needle magazine. The U-shaped holder 159 is provided adjacent its lower end with an ear or perforated lug 160 that is arranged to engage and set over a vertical pin 161 on the bracket 149. The lower end of the shaft 158 which extends below the holder 159, is arranged to engage and project through a suitable opening or socket in the horizontal plate portion 148. The ends of the tubes 156 are open and the needles are inserted therein, one above the other with their pointed ends downward (see Fig. 14), the bores of the tubes being of sufficient size to readily receive the needles and permit the passage thereof through the tubes, but are small enough to hold the needles in upright position, one on top of the other. The lower open ends of the tubes are normally closed by a plate 162 that is fixed in position upon the lower arm of the U-shaped holder 159 below the ends of the tubes. This plate is preferably glass so that the points of the needles resting and moving thereon will not be injured. At one point the plate is provided with an orifice 163 (see Figs. 8 and 14), and suitable means are provided for rotating the needle magazine to bring the tubes 156 successively in line with the orifice 163. For this purpose the lower disk 157 is provided with a series of radial pins 164 and the horizontal portion 129 of the shifter rod *v* is provided with a pivoted dog 165 that is arranged to project upwardly through a slot 166 in the horizontal plate portion 148. This dog is held by a spring 167 (see Fig. 5) against the end of the slot 166 and the dog is curved or cam-shaped so that when the shifter rod *v* is lifted the end of the dog will be projected against one of the pins 164 to turn the needle magazine one step. A holding pawl 168 is preferably formed of a curved leaf spring secured at one end to the lower end of the upright portion of the magazine holder 159. The free end of the holding pawl 168 is V-shaped and projects between the lower ends of two of the tubes 156 and accurately holds the magazine in position with one of the tubes in line with the orifice 163 in the plate 162. When a tube is brought in line with the orifice, the lowermost pin therein will drop through into an inclined tube or guide-way 169 (see Figs. 8, 9 and 10) that is carried by the reproducer arm on the rear face of the sound box, the upper end of which is preferably expanded or hopper like. A stop device in the form of a bent spring 170 (see Figs. 13 and 14) is fixed at one end to the upright portion of the magazine holder 159. The needle holding tubes 156 of the magazine are provided some distance above their lower ends with transverse slots 171 and the free end of the stop spring 170 is arranged



to project within the slot of the tube over the orifice 163 and engage the second needle therein so that only one needle will fall through the orifice 163 when the tube is brought in line therewith. As soon as the tube passes beyond the end of the stop device, the needles therein will drop down but will be arrested by the glass plate 162. In this way the needles may be fed one at a time at each operation of the machine. Holder 159 of the needle magazine is preferably removable through an opening (indicated in dotted lines in Fig. 1) in the top of the machine casing, so that the magazine may be refilled with needles from time to time. This particular form of magazine however, will hold a very large number of needles that will be accurately fed, one at a time as the machine is operated, and, as is well known, it is highly desirable to change the needle at each operation of the machine.

The guide tube 169 is arranged in line with an inclined orifice 172 in the needle holder 26 that opens into the central bore thereof just below the shoulder 144 (see Fig. 10). As the reproducer arm and sound box are lifted by the vertical movement of the shift rod *v* and rail *W*, the end of the pin 145, as stated, will be guided in the V-shaped cam slot 152. The tail of the clamp 140 will be brought against the cam 153, and as soon as the sound box is partially lifted or about in the position indicated in dotted lines in Fig. 11, the old needle will drop from the holder 26. As the sound box approaches the upper end of its movement, it will be shifted by the engagement of the cam groove with the pin 145 thereof to bring the needle holder over the end of the hook-shaped abutment or stop 154. At this point, and while the clamp 140 is still held in released position by the cam 153, the dog 165 on the shifter rod *v* will turn the needle magazine so that a new needle will drop therefrom through the guide tube 169 and guide opening 172 into the central bore of the needle holder 26. It will not fall out of the same but will be arrested in position within the holder by the abutment or stop 154. At the end of the upward movement of the sound box the tail of the clamp 140 will pass over the upper end of the cam 153 and the spring 143 will shift it to grip and hold the new needle. At the same time, the pin 145 on the sound box escapes from the upper end of the cam slot 152 and the sound box and reproducer arm slide down the then inclined rail *W* to the outer periphery of the disk on the turn-table.

To insure that the reproducer arm will always be brought to rest in such position that the pin 145 will engage the guide groove 152 when the sound box is lifted, the several disks, the record portion of

which frequently vary in length, are provided with spiral grooves 173 (see Fig. 2) leading inwardly from the end of the record portion to a circular groove 174 which is so located that it will hold the pin 145 on the end of the reproducer arm against the cam plate 146. To guide the needle into the beginning of the record groove the disks are also preferably provided with spiral grooves 175 leading inwardly from the edge thereof to the beginning of the record groove.

The operation is as follows: The sound box and reproducer arm are normally at their innermost end of their table with pin 145 thereon in engagement with the lower end of the cam plate 146 and the record previously reproduced is on the turn-table *C*. In this position, the pin 46 on the chain 44 holds the arm 47 elevated so that the governor arm 40 is held in engagement with the disk 37 to prevent the operation of the turn-table, and the lug 66 on the lever 60 is held in its uppermost position so that a coin may be dropped to position upon the lug 64 of the lever arm 61. In this position too, the disk record magazine or holder from which one of the records has been removed (in this instance the magazine at the right of the machine casing when viewed from the front) is locked against movement but the magazine at the left may be shifted if desired, by means of a button 87 on the front of the machine casing to bring any one of the disks between the arms at the left hand end of the disk shifter or carriage. If a coin is dropped into the chute 62 it will be arrested upon the lug 64 of the lever 61. The user may then turn the shaft *F* by means of the exterior handle *f*. The first initial movement of the shaft and ratchet wheel 50 thereon will as described, through the medium of the lever arms 67, 60 and 61 and rod 73 lift the locking pawl 55 out of the notch 54 of the ratchet 50 so that the shaft *F* may be turned and the dog 51 brought in line with the lug 53 on the sprocket wheel 45. The shaft *F* may then be turned through a single revolution or until the locking pawl again engages the notch 54. The spring *d* of the turn-table motor is wound up as described, through the medium of the chain 44 and sprocket wheel 43 on the motor shaft. Pin 46 on the chain is drawn from beneath the lever arm 47 so that the governor arm drops out of engagement with the disk 37 and so that the lug 66 on the lever arm 60 is lowered into mid-position in the coin chute to prevent the operation of the machine by another coin until the initiated operation is completed. The reengagement of the locking pawl 55 with the notch 54 of disk 50 throws the dog 51 out of engagement with the lug 53 on the ratchet wheel 45 so that the spring *d* may turn the parts connected thereto in opposite



direction to drive the turn-table. As the shaft F is rotated the cam 108 thereon lifts the arm P, energizes the motor spring  $p'$  and lifts the stop bar S thus shifting the dog  $s'$  thereon to free the shaft 102 and permit the operation of the automatic mechanism for changing the record disks and needle and restoring the reproducer arm. This shift of the stop device S also, as described, brings the button on its spring arm 122 against the lower disk of the governor and it is held in this position by the engagement of the pawl  $s'$  with the circular rib 119 until the shifter mechanism has changed the plates and moved the reproducer arm. When the pin 107 on the arm P passes over the shoulder of the cam 108, the motor spring  $p'$  is thrown into operation to turn the shaft 102 through a half-revolution and turn the shifter cam 132 through a single revolution. As stated, the lower end of the shifter rod  $v$  is pointed or V-shaped and sets within a correspondingly shaped notch in the cam 132. By reason of this arrangement, the instant the motor spring  $p'$  is thrown into operation the centering device on the shifter rod  $v$  is quickly lifted to release the disk on the turn-table. The continued movement of the shaft 102 through its half-revolution moves arm N and carriage M to change the plates, and at the end of its movement to one side the tooth  $t'$  on the arm 103 of the shaft engages one of the wheels T to automatically shift the disk magazine on that side one step. The movement of the shifter arm N, as stated, also automatically locks the magazine from which the record is taken and unlocks the magazine on the other side into which the disk on the table is moved by the shift of the lug 128 on the arm N from beneath the pin 127 on one pawl  $t$  and by its reengagement with the pin on the other pawl. The movement of the motor shaft 102 as stated, is arrested after a half-revolution by the engagement of the dog or pawl  $s'$  on the stop bar S with the notch in the rib 119 of the gear 111 on the shaft. After the first quick initial shift of the rod  $v$ , the continued movement of the cam 132 lifts this rod more slowly to raise the reproducer arm and sound box through the medium of the track bar W, and to turn the needle magazine through the medium of the dog or pawl 165. The reproducer arm is guided as described, during its upward shift by the engagement of the pin 145 thereon with the V-shaped cam slot 152 and the clamp 140 is shifted by its engagement with the stationary cam 153 to release the used needle and grip the new needle from the magazine that is guided into the needle holder 26 by the tube 169. Near the end of the movement of the cam 132 the shifter rod is in its uppermost position and the reproducer arm

slides outwardly toward the periphery of the disk on the turn-table and at the end of the movement of the cam the shifter rod  $v$  and centering device V are dropped to position to securely center and hold the disk upon the turn-table and also to lower the sound box and needle on the reproducer arm into engagement with the disk. The centering device V is, as previously described, provided with a conical roller on its lower end, which, when the centering device is lowered, is arranged to engage the central opening of the record and thereby accurately center the record on the turn-table, or, in other words, move or adjust it to proper central position thereon. In this way the shifted record is accurately centered or adjusted to proper position on the turn-table, and, at the same time, it is moved out of contact with the parts of the sliding carriage or record shifter, so that the latter, as shown in Fig. 2, does not contact with the record on the turn-table during the reproduction thereof. By means of the depressions 121 on rib 119, the stop device 123 will release the governor of the turn-table motor just before the needle is lowered into engagement with the disk on the turn-table so that the latter acquires a slight impetus before it is engaged by the needle. The turn-table, together with the disk thereon, are then rotated by the operating motor therefor, and the needle is guided by the spiral groove 175 into the beginning of the record groove of the disk. The reproducer arm and sound box are then swung inwardly as the needle passes through the record groove in the well-known manner to reproduce the same. It will be noted that as soon as the shaft F has been turned through a slight arc, the pawl 55 will engage the ratchet teeth of disk 50 and the winding shaft cannot be returned to its initial position, but must be rotated forwardly through a complete revolution before the actuating mechanism can be released into operation. In this way, the user is compelled to wind up the motor spring sufficiently to completely reproduce the record on the turn-table. Moreover, while the record is being reproduced the lug 66 on the arm 60 is lowered in the coin chute so that another coin cannot be inserted to release the winding shaft. At the end of its movement, the sound box will be shifted by the engagement of the needle with the spiral groove 173 until the pin 145 engages the lower end of the cam plate 146. The pin 46 on the chain 44 will then reengage the arm 47, lift the governor arm 40 to stop the operation of the turn-table motor and shift the lugs 66 to its uppermost position out of the center of the coin slot so that the machine is ready for the next operation.

It is obvious that numerous changes may



be made in the details of structure without departure from the essentials of the invention and that parts may be taken without its adoption in entirety. It is further obvious  
 5 that means other than the coin-controlled mechanism, could be employed for locking the operating parts and that the locking means could be dispensed with if desired.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In talking machines, the combination with the horizontal turn-table for rotating the record disks and operating mechanism  
 15 for said turn table, of a movable centering device coöperating with the turn-table to hold the records thereon and means for shifting the records to place between said turn-table and centering device and for re-  
 20 moving the same therefrom.

2. In talking machines, the combination with the turn-table for rotating the record disks and operating mechanism for said turn table, of a centering device above the  
 25 turn-table shiftable to and from the same and arranged to coöperate therewith to hold the record disks in position, shifter mechanism for moving the records to and from said turn-table and means for operating said  
 30 shifter mechanism and centering device.

3. In a talking machine, the combination with a rotatable record support and a traveling sound box, of a record holder or magazine, manually operable means for moving  
 35 said record holder or magazine to select a record, shifter mechanism for automatically moving the selected records to and from said holder or magazine and into and out of operative position upon said record sup-  
 40 port, shifter mechanism for automatically raising and lowering said sound box and moving the same to starting position, driving means for said record support and said shifter mechanisms, means for initiating  
 45 the operation of said driving means and means for automatically arresting the same.

4. In talking machines, the combination with the reproducer, a turn table for rotating the records and operating mechanism  
 50 for said turn table, of a record holder or magazine bodily movable to bring any one of the records thereon into line with said turn table, a shifter for moving the records to and from said magazine and into and out  
 55 of operative position with said turn table, a centering device movable to and from said turn table for positioning and holding the records thereon and means for successively operating said shifter and said centering device.  
 60

5. In a talking machine, the combination with a rotatable record support, driving means therefor and a suitable reproducer, of a record holder or magazine, means for  
 65 shifting said magazine to select a record

comprising a rotatable shaft and connections between said shaft and said magazine, shifter mechanism for automatically moving the selected record to and from said magazine and into and out of playing position  
 70 on said record support, and means automatically controlled by said shifter mechanism for preventing the operation of said magazine shifting means when one of the records is removed therefrom.

6. In a talking machine, the combination with a horizontal turn-table, a sound box laterally movable over said turn-table, and motor mechanism for rotating said turn-table, of a record magazine, a manually operable shaft connected to said magazine for raising and lowering the same to select a record, shifter mechanism for automatically moving the selected record to and from  
 85 said magazine and into and out of playing position upon said turn-table, a locking wheel upon said shaft and means coöperating with said wheel and controlled by said shifter mechanism for preventing the movement of said shaft when one of the records  
 90 is removed from said magazine.

~~be made in the details of structure without departure from the essentials of the invention and that parts may be taken without its adoption in entirety. It is further obvious that means other than the coin-controlled mechanism, could be employed for locking the operating parts and that the locking means could be dispensed with if desired.~~

7. In talking machines, the combination with a reproducer, turn-table and operating mechanism, of a holder or magazine arranged to support a plurality of disk records on one side of said turn-table, means  
 105 for shifting said magazine to bring any one of the records thereon in line with said turn-table, a pair of fixed pins arranged to engage central openings in the records and spaced apart at their adjacent ends in the plane of the turn-table and a shifter for moving the record between the ends of the pins onto the turn-table.

8. In talking machines, the combination with a horizontal rotary turn-table, operating mechanism therefor and a suitable reproducer coöperating therewith, of a vertically movable holder or magazine on one side of said turn-table arranged to support a plurality of disk records in horizontal position, a pair of fixed vertical pins arranged to extend through the central openings in said records and spaced apart at their adjacent ends in line with said turn-table, means for vertically shifting said holder or magazine to bring one of the records thereon at the space between the ends of said pins and in line with said turn-table, a horizontally movable shifter for moving the records, so located, from the magazine onto the turn-  
 125  
 130



table, a centering device for positioning and holding the record upon the turn-table and mechanism for automatically operating said shifter and centering device.

5 9. In a talking machine, the combination with a rotatable turn-table for supporting disk records in playing position, and a co-operating sound box, of a record holder or magazine bodily movable to select a record,  
10 shifter mechanism for automatically moving the selected record to and from said holder and into and out of playing position upon said turn-table, shifter mechanism for automatically raising and lowering said  
15 sound box and for moving the same to starting position, feeding mechanism for automatically shifting said magazine step by step to bring the records thereon successively into coöperative relation with said shifter  
20 mechanism, and means extending to the exterior of the machine casing for manually shifting same magazine to select any one of the records thereon.

25 10. In talking machines, the combination with an inclosing casing, a motor mechanism for rotating the record and a traveling sound box arranged within said casing, and an amplifying horn communicating with said sound box, of a record holder or  
30 magazine arranged within said casing, a shifter for moving the records to and from said magazine and into and out of operative relation with said traveling sound box and said motor mechanism, said magazine  
35 being bodily movable to bring any one of the records thereon into position to be operated upon by said shifter, and mechanism for automatically and successively moving said shifter and said magazine.

40 11. In talking machines, the combination with the reproducer, horizontal turn-table and motor mechanism, of a holder or magazine for a plurality of disk records mounted  
45 at one side of said turn-table and vertically movable to bring any one of the records thereon in line with said turn-table, a carriage horizontally slidable in line with said turn-table for moving the records to and  
50 from said magazine and into and out of position on said turn-table and mechanism for automatically operating said magazine and said carriage.

55 12. In talking machines, the combination with the reproducer, turn-table and motor mechanism, of a holder or magazine for disk records vertically movable to bring any one of the records thereon opposite said  
60 turn-table, fixed guiding means for preventing the displacement of said records from the magazine, except the record opposite the turn-table and shifter mechanism for automatically moving such record to and from the magazine and into and out of position upon the turn-table.

65 13. In talking machines, the combination

with the reproducer, horizontal turn-table and motor mechanism for the turn-table, of a vertically shiftable holder or magazine for a plurality of disk records at one side  
70 of said turn-table, a pair of vertical fixed pins arranged to engage central openings in the disk records on said magazine to prevent the displacement of the records therefrom, but said pins being spaced apart at  
75 their adjacent ends to permit removal of the record opposite the turn-table, shifter mechanism for moving such record to and from the magazine and into and out of position upon the turn-table, means for vertically  
80 moving said magazine and means for preventing the movement of said magazine when any one of the records is removed therefrom.

14. In talking machines, the combination with the reproducer, horizontal turn-table  
85 and motor mechanism, of a holder or magazine for disk records vertically movable to bring any one of the records thereon opposite the turn-table, a shifter for moving such record to and from the magazine and  
90 into and out of position upon the turn-table, means for vertically shifting said magazine and mechanism for operating said shifter arranged to lock and unlock the actuating means for said magazine, whereby the movement of the magazine is prevented when one  
95 of the records is removed therefrom.

15. In talking machines, the combination with the reproducer, horizontal turn-table and motor mechanism, of a holder or magazine for disk records vertically movable to  
100 bring any one of the records thereon opposite the turn-table, a shifter for moving such record to and from the magazine and into and out of operative position upon the turn-table, a lock for holding the magazine against movement, means for operating  
105 said shifter and means for moving said magazine and common mechanism for operating the shifter and magazine actuating means and for setting and releasing said lock.

16. In talking machines, the combination with the reproducer, horizontal turn-table and motor mechanism, of a holder or magazine for disk records vertically movable  
115 to bring any one of the records thereon opposite the turn-table, a shifter for moving such record to and from the magazine and into and out of operative position upon the turn-table, an operating arm for said shifter, an operating shaft for said magazine, connections between said shaft and said magazine, a ratchet wheel on said shaft  
120 and a drive shaft having a crank arm arranged to engage and operate said shifter arm and said ratchet wheel to successively operate said disk shifter and magazine.

17. In talking machines, the combination with the inclosing casing and with the re- 130



producer, turn-table and motor mechanism therein, of a holder or magazine for disk records in said casing vertically movable to bring any one of the records thereon opposite said turn-table, a sliding shifter for moving such record to and from the magazine and into and out of position upon the turn-table, means operable from the exterior of the machine casing for moving said magazine, a lock for said operating means, an actuating arm for said shifter arranged to trip and release said lock and actuating means for said arm.

ranged to engage and release said pawl and means for operating said arm.

21. In talking machines, the combination with the inclosing casing and with the reproducer, turn-table and motor mechanism therein, of a holder or magazine for disk records in said casing vertically movable to bring any one of the records thereon opposite said turn-table, a sliding shifter for moving such record to and from the magazine and into and out of position upon the turn-table, a shaft operable from the exterior of the machine casing, operating connections between said shaft and said magazine, a ratchet wheel on said shaft, a spring held locking pawl coöperating with said ratchet, a pivoted arm operatively connected to said shifter and having a lug arranged to engage and trip said locking pawl, and a drive shaft having a crank arm engaging and operating said arm and provided with a toothed end arranged to engage said ratchet wheel to move said shaft and magazine.

22. In talking machines, the combination with the inclosing casing and with the reproducer, turn-table and motor mechanism therein, of a holder or magazine for disk records in said casing vertically movable to bring any one of the records thereon opposite said turn-table, a sliding shifter for moving such record to and from the magazine and into and out of position upon the turn-table, a shaft operable from the exterior of the machine casing, connections between said shaft and said magazine, a ratchet wheel connected with said shaft, a spring held locking pawl coöperating with said ratchet wheel and arranged, in one position, to lock said ratchet and shaft against movement and, in another position, to act as a holder pawl to prevent the movement of said ratchet and shaft in one direction only, and operating means for actuating said shifter and for moving said pawl from one to the other position.

23. In talking machines, the combination with the machine casing and with the horizontal turn-table, reproducer and motor mechanism in said casing, a counter-balanced holder or magazine for disk records in said casing on one side of said turn-table, said magazine being vertically shiftable to bring any one of the records thereon opposite said turn-table, a shifter for moving such record to and from the magazine and into and out of position on the turn-table, a pivoted arm engaging said magazine, a shaft, a heart-shaped cam on said shaft engaging and operating said arm, means for operating said shaft from the exterior of the machine casing, a ratchet wheel connected to said shaft, a locking pawl coöperating with said ratchet and automatic mechanism in the machine casing for operating

18. In talking machines, the combination with the inclosing casing and with the reproducer, turn-table and motor mechanism therein, of a holder or magazine for disk records in said casing vertically movable to bring any one of the records thereon opposite said turn-table, a sliding shifter for moving such record to and from the magazine and into and out of position upon the turn-table, a shaft projecting through and operable from the exterior of the machine casing, operating connections between said shaft and said magazine, a ratchet wheel on said shaft, a spring-held locking pawl coöperating with said ratchet, an arm for operating said shifter arranged to trip and release said pawl and mechanism for automatically and successively operating said arm and advancing said shaft and magazine step by step.

19. In talking machines, the combination with the inclosing casing and with the reproducer, turn-table and motor mechanism therein, of a holder or magazine for disk records in said casing vertically movable to bring any one of the records thereon opposite said turn-table, a sliding shifter for moving such record to and from the magazine and into and out of position upon the turn-table, means operable from the exterior of the machine casing for vertically shifting said magazine, a lock for said operating means and mechanism arranged to automatically and successively move said shifter, release said lock and operate said magazine actuating means.

20. In talking machines, the combination with the inclosing casing and with the reproducer, turn-table and motor mechanism therein, of a holder or magazine for disk records in said casing vertically movable to bring any one of the records thereon opposite said turn-table, a sliding shifter for moving such record to and from the magazine and into and out of position upon the turn-table, a shaft operable from the exterior of the machine casing, operating connections between said shaft and said magazine, a ratchet wheel on said shaft, a spring-held locking pawl coöperating with said ratchet wheel, a pivoted arm operatively connected with said shifter having a lug ar-



said disk shifter, tripping said locking pawl and advancing said magazine operating shaft step by step.

24. In talking machines, the combination with the reproducer, horizontal turn-table, and motor mechanism therefor, of a record holder or magazine for supporting a plurality of disk records one above the other, a shifting carriage mounted to slide in the horizontal plane of said turn-table and comprising connected side bars for engaging one of the records on said magazine and moving the same onto said turn-table, means for vertically shifting said magazine to bring any one of the records thereon between the side bars of said shifting carriage mechanism for automatically operating said carriage and means for automatically locking said magazine when one of the records is removed therefrom.

25. In a talking machine, the combination with a horizontal turn-table, an operating motor therefor and a traveling sound box, of a magazine or holder for records vertically shiftable to bring the records thereon adjacent said turn-table, shifter mechanism for automatically moving said records between said magazine and said turn-table, a motor driven shaft, and cam devices connected to said shaft for actuating said shifter mechanism to thereby automatically move the records to and from said magazine and into and out of playing position on said turn-table.

26. In a talking machine, the combination with a horizontal turn-table, an operating motor therefor and a coöperating traveling sound box, of a holder or magazine for a number of disk records vertically shiftable to bring the records thereon adjacent said turn-table, shifter mechanism for moving the records from said magazine and for returning the same thereto, a vertically shiftable centering device coöperating with said turn-table for holding the records thereon, shifter mechanism for raising and lowering the sound box and returning the same to starting position, and means for automatically actuating said centering device and said record and sound box shifter mechanisms.

27. In talking machines, the combination with the reproducer, turn-table and operating motor mechanism, of a magazine or holder for records shiftable to bring any one of the records thereon in line with said turn-table, a shifter for moving the records to and from said magazine and into and out of position on said turn-table, a pivoted arm operatively engaging said shifter, a motor driven shaft and a crank arm on said shaft having a pin engaging a cam slot in said arm.

28. In talking machines, the combination with the reproducer, horizontal turn-table

and operating motor, of a holder or magazine for a number of disk records vertically shiftable to bring any one of the records opposite said turn-table, a shifter for moving the records to and from the magazine and into and out of position upon the turn-table, a vertically movable centering device co-operating with the turn-table for positioning and holding the records thereon and mechanism for automatically and successively operating said centering device, said shifter and said magazine.

29. In talking machines, the combination with the reproducer, horizontal turn-table and operating motor, of a holder or magazine for a number of disk records vertically shiftable to bring any one of the records opposite said turn-table, a shifter for moving the records to and from the magazine and into and out of position upon the turn-table, a vertically movable centering device co-operating with the turn-table for positioning and holding the records thereon, a shifter rod whereon said centering device is mounted, a cam for operating said rod to raise and lower said centering device, an operating arm for said record shifter and a drive shaft operatively connected to said arm and to said cam.

30. In talking machines, the combination with the inclosing casing, the traveling sound box and motor mechanism in said casing for rotating the records, and an amplifying horn communicating with said traveling sound box, of shifter mechanism for moving the records into and out of operative relation with said sound box and said motor, shifter mechanism for returning the sound box to initial position, and means operable from the exterior of the machine casing for initiating the operation of said motor and of said shifter mechanism, the shifter mechanism for the sound box being arranged to lower the same into engagement with the record after said motor has started to rotate the record.

31. In talking machines, the combination with the sound box and operating motor, of mechanism for shifting the records into and out of operative relation with said sound box and motor mechanism and for restoring said sound box to initial position, a motor driven shaft for operating said shifter mechanism, means for initiating the operation of said shaft and means controlled by the operation thereof for automatically arresting the same after a movement through a predetermined distance.

32. In talking machines, the combination with the sound box and operating motor, of mechanism for shifting the records into and out of operative relation with said sound box and motor, mechanism for shifting said sound box to initial position, a motor driven shaft for operating said shifter mechanism,



means for initiating the operation of said motor and shaft, stop devices for checking the operation of said motor during the operation of said shifter mechanisms and for  
 5 arresting the movement of said shaft and shifter mechanisms.

33. In talking machines, the combination with the reproducer and operating motor, of shifter mechanism for successively moving  
 10 the records into and out of operative relation with said reproducer and motor, devices for initiating the operation of said shifter mechanism, means for locking said devices and means for preventing the release of said  
 15 locking means during the operation of said motor.

34. In talking machines, the combination with the inclosing casing, reproducer and operating motor therein, of shifter mechanism  
 20 in said casing for moving the records into and out of operative relation with said reproducer and motor, devices for initiating the operation of said shifter mechanism, means for locking said devices, stop devices  
 25 controlled by said motor for automatically arresting its operation and means controlled by said stop devices for preventing the release of said locking means during the operation of said motor.

35. In talking machines, the combination with the machine casing and the sound box and operating motor therein, of shifter mechanism for moving the records into and  
 35 out of operative relation with said motor and sound box and for restoring said sound box to initial position, devices operable from the exterior of the machine casing for initiating the operation of said motor and  
 40 shifter mechanism, and means for preventing the operation of said motor during the operation of said shifter mechanism.

36. In talking machines, the combination with the machine casing and the traveling sound box and operating motor therein, of shifter mechanism for moving the records  
 45 into and out of operative relation with said motor and traveling sound box, devices operable from the exterior of the machine casing for initiating the operation of said motor and shifting mechanism, a lock for said  
 50 initiating devices and means controlled by said motor for preventing the release of said lock during the operation of the motor.

37. In talking machines, the combination with the machine casing and the sound box and operating motor therein, of shifter mechanism for moving the records into and  
 55 out of operative relation with said motor and sound box, mechanism for shifting said sound box to initial position, devices operable from the exterior of the machine casing for initiating the operation of said motor and shifter mechanisms, means for preventing the operation of the motor during  
 60 the operation of the shifter mechanisms and

means for preventing the operation of the shifter mechanisms during the operation of the motor.

38. In talking machines, the combination with the inclosing casing, the traveling  
 70 sound box and operating motor therein, of shifter mechanism in the casing for moving the records into and out of operative relation with said motor and sound box and for moving said sound box to initial position, an operating spring motor for said shifter mechanism, means operable from the exterior of the machine casing for winding  
 75 and initiating the operation of said motor and means controlled by said motor for automatically arresting its operation.

39. In talking machines, the combination with the inclosing casing, the reproducer and operating motor therein, of shifter mechanism in the casing for moving the  
 85 records into and out of operative relation with said motor and reproducer, an operating spring motor for said shifter mechanism, a single means operable from the exterior of the machine casing for both winding and initiating the operation of said motor and means controlled by said shifter  
 90 actuating motor for preventing the operation of said first mentioned motor during the movement of said shifter mechanism.

40. In talking machines, the combination with the inclosing casing, the reproducer and operating motor therein, of shifter mechanism in the casing for moving the records into and out of operative relation  
 100 with said motor and reproducer, an operating spring motor for said shifter mechanism, means operable from the exterior of the machine casing for winding and initiating the operation of said motor, a releasable  
 105 lock for said winding means and devices controlled by said operating motor for preventing the release of said lock until said motor has ceased operation.

41. In talking machines, the combination with the inclosing casing, the reproducer and operating motor therein, of shifter mechanism in the casing for moving the records into and out of operative relation  
 110 with said motor and reproducer, an operating spring motor for said shifter mechanism, means operable from the exterior of the machine casing for winding and initiating the operation of said motor, a releasable  
 115 lock for said winding means, stop devices controlled by said operating motor for checking its movement and means controlled by said stop devices for preventing the release of said winding means during the operation of said motor.

42. In talking machines, the combination with the machine casing, and the reproducer and main operating spring motor therein, of shifter mechanism for moving the records  
 120 into and out of operative relation with said



reproducer and said main motor, a supplemental spring motor for actuating said shifter mechanism and a single means operable from the exterior of the machine casing for both simultaneously winding and initiating the operation of both of said motors.

43. In talking machines, the combination with the machine casing and the reproducer and main operating spring motor therein, of shifter mechanism for moving the records into and out of operative relation with said reproducer and said main motor, a supplemental spring motor for actuating said shifter mechanism, means operable from the exterior of the machine casing for simultaneously winding and initiating the operation of both of said motors, a lock for said winding means and means for preventing the release of said lock during the operation of said main operating motor.

44. In talking machines, the combination with the machine casing and the reproducer and main operating spring motor therein, of shifter mechanism for moving the records into and out of operative relation with said reproducer and said main motor, a supplemental spring motor for actuating said shifter mechanism, means operable from the exterior of the machine casing for simultaneously winding said main and supplemental spring motors and for initiating their operation, means controlled by each of said motors for automatically arresting its operation and means controlled by said supplemental motor for preventing the operation of said main motor during the movement of said shifter mechanism.

45. In talking machines, the combination with the inclosing casing, of a shiftable sound box and operating motor for rotating the records mounted within said casing, an amplifying horn communicating with said sound box, a holder or magazine for disk records in said casing, shifter mechanism for moving the records to and from said magazine and into and out of operative relation with said motor mechanism and sound box, means operable from the exterior of the casing for moving said magazine to bring any selected record therein into operative relation with said shifter mechanism and means interposed between said motor mechanism and said shifter mechanism for preventing the operation of the latter during the operation of said motor mechanism.

46. In talking machines, the combination with the inclosing casing, of a shiftable sound box, turn table and operating motor for rotating the records within said casing, an amplifying horn communicating with said sound box, a holder or magazine for disk records in said casing, shifter mechanism for moving the records between said

magazine and said turn table, devices operable from the exterior of the machine casing for initiating the operation of said shifter mechanism and motor, a releasable lock for said initiating devices and means controlled by the operation of said motor for preventing the release of said lock during the operation of said turn table.

47. In talking machines, the combination with the machine casing, the reproducer, turn-table and operating motor for the turn-table in said casing, of a holder or magazine for disk records in said casing, a shifter for moving the records between said magazine and turn-table, means operable from the exterior of the machine casing for simultaneously initiating the operation of said turn-table, motor and said shifter mechanism and means for checking the operation of said turn-table during the operation of said shifter mechanism.

48. In talking machines, the combination with the machine casing, the sound box, turn-table and operating motor for the turn-table in said casing, of a holder or magazine for disk records in said casing, a shifter mechanism for moving the records between said magazine and said turn-table and for moving said sound box to initial position, a spring motor for operating said shifter mechanism, means operable from the exterior of the machine casing for winding and initiating the operation of said spring motor, stop devices controlled by said spring motor for automatically arresting its operation and means controlled by said stop devices for preventing the operation of said turn-table during the movement of said shifter mechanism.

49. In talking machines, the combination with the machine casing, the reproducer, turn-table and operating motor for the turn-table in said casing, of a holder or magazine for disk records in said casing, a shifter for moving the records between said magazine and said turn-table, a spring motor for operating said shifter mechanism, devices operable from the exterior of the machine casing for winding and initiating the operation of said spring motor, a releasable lock for said winding devices and means controlled by said turn-table motor for preventing the release of said lock during the operation of said turn-table.

50. In talking machines, the combination with the machine casing, of a reproducer and motor mechanism in said casing, a bodily movable record magazine, mechanism for automatically shifting said magazine, changing the record, restoring said reproducer and changing the reproducer stylus at each successive operation of the machine.

51. In talking machines, the combination with the reproducer and motor mechanism,



of a record magazine bodily movable to bring the records thereon opposite said reproducer and motor mechanism, a needle magazine and mechanism for automatically shifting the record from said magazine to said motor mechanism and providing said reproducer with a needle from said needle magazine at each successive operation of the machine.

52. In talking machines, the combination with the inclosing casing, the traveling sound box, turn table and motor mechanism for rotating said turn table arranged in said casing, and an amplifying horn communicating with said sound box, of a magazine for holding records in said casing, means for bodily shifting said magazine to bring any record thereon in line with said turn table, a shifter for moving records between said magazine and said table, a needle magazine, a shifter for projecting needles therefrom to said sound box, a shifter for restoring said sound box to initial position, and mechanism for automatically and successively operating said shifters.

53. In talking machines, the combination with the operating motor, of shifter mechanism for moving the records into and out of operative relation with said motor, a reproducer having needle-clamping means, cam devices for operating said needle-clamping means, a shifter for moving said reproducer into operative relation with said cam devices, a needle magazine and means operated by said shifter for projecting a needle from said magazine to the clamping means of said reproducer.

54. In talking machines, the combination with the horizontal turn-table and its motor mechanism, of shifter mechanism for moving disk records into and out of operative position upon said turn-table, a cooperating reproducer having a needle holder provided with a spring-held needle clamp, fixed cam devices controlling the movement of said reproducer and the operation of said needle-clamp, a second shifter mechanism for moving said reproducer into operative relation with said cam devices, a needle magazine, means operated by said shifter mechanism for projecting the needle therefrom, said reproducer having means for guiding the needle from the magazine to the needle holder thereof and means for automatically operating said record shifter mechanism and said reproducer shifter mechanism.

55. In talking machines, the combination with the turn-table and its motor mechanism, of shifter mechanism for moving disk records into and out of operative position upon said turn-table, a centering device cooperating with said turn-table to position and hold the records thereon, a shifter rod whereon said centering device is mounted, a

reproducer arm mounted to shift horizontally and vertically, a reproducer carried by said arm and means operated by said shifter rod for restoring said arm and reproducer.

56. In talking machines, the combination with the turn-table and its motor mechanism, of shifter mechanism for moving disk records into and out of operative position upon said turn-table, a centering device cooperating with said turn-table to position and hold the records thereon, a shifter rod whereon said centering device is mounted, a reproducer arm mounted to shift horizontally and vertically, a reproducer carried by said arm and a rail pivoted at one end to the machine frame and at its other end to said shifter rod, said rail extending beneath said reproducer arm and arranged, when moved by said shifter rod, to restore said arm and reproducer.

57. In talking machines, the combination with the turn-table and its motor mechanism, of shifter mechanism for moving disk records, a centering device cooperating with said turn-table to position and hold the records thereon, a shifter rod whereon said centering device is mounted, a reproducer arm mounted to shift horizontally and vertically, a reproducer on said arm having a spring-held needle clamp, means operated by said shifter rod for elevating and restoring said arm and reproducer, cam devices for controlling the vertical shift of said reproducer and for tripping said needle clamp, a needle magazine and means operated by said shifter rod for projecting the needle therefrom, said reproducer having means for guiding the needle from the magazine to its needle clamp.

58. In talking machines, the combination with the inclosing casing, of a turn-table and motor mechanism in said casing, shifter mechanism for moving disk records into and out of operative position upon said turn-table, a reproducer arm mounted to shift horizontally and vertically, a second shifter mechanism for elevating and restoring said reproducer arm, a reproducer on said arm having needle-clamping means, a needle magazine, devices cooperating with said second shifter mechanism for tripping said clamping means to release the old needle and for projecting a new needle from said magazine to said clamping means and devices for operating both of said shifter mechanisms.

59. In talking machines, the combination with the operating motor, of a reproducer cooperating therewith having releasable needle-clamping means, means for shifting and restoring said reproducer, a fixed cam for engaging and tripping said needle-clamping means to release the used needle, a fixed stop or abutment for holding the new



needle in position within said clamp, a second fixed cam controlling the shift of said reproducer and for guiding said needle-clamping means into operative relation with  
 5 said releasing cam and said stop or abutment, a needle magazine and means for projecting a needle therefrom to the needle-clamping means of said reproducer.

60. In talking machines, the combination  
 10 with the turn-table and its operating motor, of a reproducer arm mounted to shift both horizontally and vertically, a reproducer mounted on said arm having a needle holder provided with a releasable clamp, means for  
 15 shifting and restoring said arm and reproducer, a fixed cam for tripping said clamp to release the used needle, a fixed stop or abutment for arresting the new needle in position within said holder, an auxiliary fixed  
 20 cam controlling the shift of said reproducer and guiding said clamp and needle holder into operative relation with said tripping cam and said stop or abutment, a needle magazine and devices operated by the repro-  
 25 ducer shifting and restoring means to project a new needle therefrom, said reproducer having means for guiding a needle from said magazine to the needle holder thereof.

61. In a talking machine, the combination  
 30 with a turn-table for rotating disk records, of a traveling sound box having a releasable needle clamp and a needle guide passage leading to said clamp, a needle magazine rotatably mounted upon the machine frame  
 35 above one end of the path of movement of said sound box, said rotatable magazine comprising a circular series of vertical needle-  
 40 holding tubes, a fixed plate below said magazine having an opening therein, means operable to release said needle clamp when said sound box is in position below said magazine  
 45 and means for rotating said magazine step by step to bring said tubes in line with said opening to discharge the needle there-  
 through and into the needle guide of said reproducer.

62. In talking machines, the combination  
 with the operating motor, of a reproducer  
 50 coöperating therewith having a releasable needle clamp and a needle guide passage leading thereto, means for releasing said clamp to discharge the used needle, a rotary  
 needle magazine in position above said re-  
 55 producer when at one end of its movement, said magazine comprising a series of vertical  
 needle-holding tubes, a fixed plate below said magazine having an opening therein, each of  
 60 said tubes being arranged to support a number of needles arranged end to end, one above  
 the other, means for rotating said magazine  
 step by step to bring said tubes successively  
 in line with the opening in said plate and  
 with the needle guide of said reproducer and  
 means for preventing the discharge of but

one needle from any of the tubes of said  
 65 magazine when in line with the opening of  
 said plate.

63. In talking machines, the combination  
 with the turn-table and its operating motor,  
 of a reproducer arm arranged to shift hori-  
 70 zontally and vertically, a reproducer mounted  
 on said arm having a releasable needle  
 clamp, mechanism for discharging the old  
 needle and placing a new needle in said clamp  
 and a record driven by said motor having a  
 75 record groove for engaging and propelling  
 the needle of said reproducer and a groove  
 leading from the record groove for guiding  
 said reproducer into operative relation with  
 said needle changing mechanism. 80

64. In talking machines, the combination  
 with the turn-table and its motor mecha-  
 nism, of a reproducer arm mounted to shift  
 horizontally and vertically, a reproducer on  
 said arm having a suitable needle holder and  
 85 needle, shifter mechanism for restoring said  
 arm and reproducer, means coöperating  
 with said shifter mechanism for changing  
 the needle in the holder of said reproducer  
 and a record on said turn-table having a  
 90 sound groove for engaging the needle of the  
 reproducer and propelling the same, said  
 record having a groove leading from the  
 sound groove thereof for guiding the repro-  
 95 ducer into operative relation with said nee-  
 dle changing means.

65. In talking machines, the combination  
 with the machine casing, of an operating  
 motor for rotating disk records in said cas-  
 100 ing, a sound box having a stylus for engag-  
 ing the records, a shifter mechanism for  
 moving the records into and out of operative  
 relation with said sound box and said motor,  
 a second shifter mechanism for shifting said  
 sound box and for changing the stylus there-  
 105 of, a supplemental motor for operating said  
 shifter mechanisms, means for initiating the  
 operation of said motors, and means for  
 automatically and successively arresting the  
 110 movement of said supplemental motor and  
 said main operating motor, substantially as  
 described.

66. In talking machines, the combination  
 with the machine casing, of an operating  
 motor in said casing, a reproducer, shifter  
 115 mechanism for moving the records into and  
 out of operative relation with said motor  
 mechanism and reproducer and for restoring  
 said reproducer, an operating spring motor  
 for said shifter mechanism, means operable  
 120 from the exterior of the machine casing for  
 winding and initiating the operation of said  
 motor and a releasable lock for said wind-  
 ing means.

67. In talking machines, the combination  
 125 with the machine casing, of an operating  
 motor in said casing, a reproducer, shifter  
 mechanism for moving the records into and



out of operative relation with said motor mechanism and reproducer and for restoring said reproducer, an operating spring motor for said shifter mechanism, means operable  
 5 from the exterior of the machine casing for winding and initiating the operation of said motor, a lock for said winding means, means for releasing said lock and devices for preventing the operation of said releasing  
 10 means during the reproduction of a record.

68. In talking machines, the combination with a turn-table and its operating motor, of a reproducer arm mounted to shift horizontally and vertically, a reproducer carried on said arm, shifter mechanism for elevating and restoring said arm, a needle magazine and mechanism cooperating with said reproducer and said magazine for discharging the used needle and placing a new one  
 20 in said reproducer.

69. In talking machines, the combination with the machine casing, of a turn-table in said casing, an operating spring motor therefor, a record magazine, a shifter for  
 25 moving the records between said magazine and said turn-table, a reproducer cooperating with the record on said turn-table, a second shifter for elevating and restoring said reproducer, means cooperating with said reproducer and its shifter for changing the needle of said reproducer, an auxiliary  
 30 spring motor to operate said record shifter and said reproducer shifter, means operable from the exterior of the machine casing for winding and initiating the operation of said  
 35 turn-table motor and said auxiliary shifter motor and means for preventing the operation of said turn-table motor during the movement of said auxiliary shifter motor.

70. In talking machines, the combination with the machine casing, of a turn-table in said casing, an operating spring motor therefor, a record magazine, a shifter for moving the records between said magazine  
 45 and said turn-table, a reproducer cooperating with the record on said turn-table, a second shifter for elevating and restoring said reproducer, means cooperating with said reproducer and its shifter for changing the needle of said reproducer, a second  
 50 spring motor to operate said record shifter and said reproducer shifter, means operable from the exterior of the machine casing for winding and initiating the operation of said  
 55 turn-table motor and said shifter motor, a releasable lock for said winding means and means for preventing the release of said lock during the operation of said motors.

71. In talking machines, the combination with the machine casing, of a turn-table in said casing, an operating spring motor therefor, a record magazine, a shifter for moving the records between said magazine  
 60 and said turn-table, a reproducer cooperating

with the record on said turn-table, a  
 65 second shifter for elevating and restoring said reproducer, means cooperating with said reproducer and its shifter for changing the needle of said reproducer, a second  
 70 spring motor to operate said record shifter and said reproducer shifter, means operable from the exterior of the machine casing for winding and initiating the operation of said  
 75 turn-table motor and said shifter motor, stop devices controlled by each of said motors for arresting the movement thereof and devices for preventing the operation of said winding means during the operation of said  
 80 motors.

72. In a talking machine, the combination  
 80 with a turn-table for disk-records, driving mechanism for said turn-table, a hollow reproducer arm mounted to shift both horizontally and vertically, a sound box on said  
 85 arm adapted to cooperate with the record on said turn-table, an amplifying horn communicating with said arm, shifter mechanism for automatically moving records into and out of operative position upon said turn-  
 90 table, manually operable means for shifting a selected record into operable position with said shifter mechanism, and shifter mechanism for automatically raising and lowering  
 95 said arm and moving the same to starting position.

73. In talking machines, the combination with the machine casing, of a turn-table and its motor in said casing, shifter mechanism for moving records into and out of operative  
 100 relation on said turn-table, a centering device cooperating with said turn-table to position and hold the records thereon and an amplifying horn projecting through said casing, a hollow reproducer arm mounted to  
 105 swing horizontally and vertically at the inner end of said horn, a reproducer mounted upon said arm and free to engage and be propelled by the record on said turn-table and a shifter for lifting and restoring said  
 110 arm.

74. In talking machines, the combination with the machine casing, of a horizontal  
 115 turn-table and its motor mechanism in said casing, an amplifying horn projecting from said casing, a hollow reproducer arm mounted upon the inner end of said horn to swing horizontally and vertically, a reproducer  
 120 carried on said arm and free to engage and be propelled by the record on said turn-table, means for initiating the operation of said motor, stop devices controlled by said motor for automatically arresting its operation, a shifter for lifting and restoring said  
 125 arm and reproducer, a needle magazine, means for supplying the reproducer with fresh needles from said magazine and mechanism for operating said shifter and said  
 130 needle changing means.



75. In talking machines, the combination with the turn-table and reproducer, of a pair of holders or magazines for disk records on opposite sides of said turn-table, means for vertically moving said magazines to bring the records thereon opposite said turn-table, and a horizontally sliding shifter for moving the record on the turn-table into one of the magazines and for simultaneously placing a new record thereon from the other of said magazines.

76. In talking machines, the combination with the horizontal turn-table, its motor mechanism and reproducer, of a pair of vertically movable holders or magazines for disk records on opposite sides of said turn-table, a horizontally sliding shifter for alternately moving the records to and from said magazines and into and out of operative position on said turn-table and mechanism for operating said shifter and for vertically moving said magazines.

77. In talking machines, the combination with the machine casing, of a turn-table, its motor mechanism and a cooperating reproducer in said casing, a pair of holders or magazines for disk records in said casing on opposite sides of said turn-table, mechanism operable from the exterior of the machine casing for vertically shifting said magazines to bring any one of the records thereon opposite said turn-table, shifter mechanism for alternately moving the records to and from said magazines and into and out of operative position upon the turn-table and means for locking either of said magazines when one of the records is removed therefrom.

78. In talking machines, the combination with the machine casing, of a turn-table, its motor mechanism and a cooperating reproducer in said casing, a pair of holders or magazines for disk records in said casing on opposite sides of said turn-table, mechanism operable from the exterior of the machine casing for vertically shifting said magazines to bring any one of the records thereon opposite said turn-table, shifter mechanism for alternately moving the records to and from said magazines and into and out of operative position upon the turn-table, locking devices for said magazines and operating mechanism for said shifter arranged to alternately release the locking devices of the separate magazines.

79. In talking machines, the combination with mechanism for rotating the records, a sound box having a needle for engaging the records and an amplifying device communicating with said sound box, of a record holder or magazine, shifter mechanism for automatically having the records to and from said magazine and into and out of operative relation with said rotating mechanism and said sound box, means for moving said magazine to bring any one of the rec-

ords thereon into engagement with said shifter mechanism, and means for rendering said moving means inoperative when one of the records is removed therefrom.

80. In talking machines, the combination with a horizontal turn-table and motor mechanism for rotating disk records, a sound box having a needle for engaging the records, said sound box being movable over the turn-table, and an amplifying device communicating with said sound box, of a holder or magazine for disk records on one side of said turn-table, shifter mechanism for automatically moving any one of the records in said magazine to and from the turn-table, said magazine being vertically movable to bring any one of the records thereon into engagement with said shifter mechanism, and fixed means for preventing the displacement of any of the records from the magazine except the record in engagement with said shifter mechanism.

81. In talking machines, the combination with a horizontal turn-table and motor mechanism for rotating disk records, of a sound box movable over said turn-table and having a needle for engaging the record, and an amplifying device communicating with said sound box, of a magazine for holding disk records one above the other on one side of said turn-table, shifter mechanism for automatically moving the records to and from the magazine and into and out of position upon the turn-table, means for vertically moving said magazine to bring any one of the records thereon into engagement with said shifter mechanism, devices for preventing the operation of said moving means when a record is removed from said magazine, and means for preventing the displacement of any of the records from the magazine, except the record in engagement with said shifter mechanism.

82. In talking machines, the combination with the inclosing casing, of a turn-table and motor mechanism therein for rotating disk records, a sound box movable over the turn-table and having a needle for engaging the records, and an amplifying device communicating with said sound box, a magazine for holding disk records one above the other on one side of said turn-table, a horizontally movable shifter for automatically moving the records to and from the magazine and into and out of position upon the turn-table, means operable on the exterior of the casing for vertically moving the magazine to bring any one of the records thereon into engagement with said shifter, and devices controlled by the operation of said shifter for rendering the said moving means inoperative when one of the records is removed from the magazine.

83. In talking machines, the combination with the inclosing casing, of a turn-table



and motor mechanism therein for rotating disk records, a sound box movable over the turn-table and having a needle for engaging the records, an amplifying device communicating with said sound box, a magazine for holding disk records one above the other on one side of said turn-table, a horizontally movable shifter for moving the records to and from the magazine and into and out of position upon the turn-table, means operable on the exterior of the casing for vertically moving the magazine to bring any one of the records thereon into engagement with said shifter, devices controlled by the movement of said shifter for preventing the operation of said magazine moving means when a record is removed therefrom, means for preventing the displacement of any of the records from the magazine except the record in engagement with said shifter and mechanism for automatically operating said shifter and for initiating the operation of said turn-table and sound box.

84. In talking machines, the combination with a casing, of a turn-table and motor mechanism in said casing for rotating disk records, a sound box movable over said turn-table and having a needle for engaging the records thereon, and an amplifying device opening outside of said casing and communicating with said sound box, a magazine for holding disk records one above the other at one side of said turn-table, a shifter for moving the records to and from said magazine and into and out of position upon said turn-table, means operable from the exterior of the casing for vertically moving said magazine to bring any one of the records thereon into engagement with said shifter, mechanism for automatically operating said shifter and for initiating the operation of said turn-table and said sound box and means controlled by said mechanism for rendering said magazine moving means inoperative when a record is removed from the magazine.

85. In talking machines, the combination with a horizontal turn-table and motor mechanism for rotating disk records, a sound box movable over the said turn-table and carrying a needle for engaging the records, and amplifying means communicating with said sound box, of a holder or magazine for supporting a plurality of disk records one above the other arranged at one side of said turn-table, means for vertically moving said magazine to bring any one of the records thereon into line with said turn-table, a carriage horizontally slidable in line with said turn-table for moving the records to and from said magazine and into and out of position on said turn-table, fixed guides for said carriage and mechanism for automatically shifting said carriage in opposite directions.

86. A talking machine comprising a support for talking machine records, actuating means therefor, a magazine for holding talking machine records, auxiliary actuating means, and means actuated by said auxiliary means for moving a talking machine record from said magazine to said support and for returning said record from said support directly to its original position in said magazine.

87. In a talking machine, a turntable, a movable sound reproducer, means for successively placing the records on, and removing the same from said turntable, means for withdrawing said sound reproducer from the records, returning the same to the starting position and for placing said sound reproducer mechanism in contact with said record, said means comprising an inclined support, along which said sound reproducer mechanism is adapted to slide, and means for raising and lowering said support, and connections between said means for placing the records upon the turntable and said support.

88. In a talking machine, sound reproducing mechanism, means for automatically operating said reproducing mechanism in relation to the record, comprising an inclined arm, a vertically reciprocating rod for raising the said arm to withdraw said reproducing mechanism from the record and to allow said reproducing mechanism to traverse the said arm in a downward direction, and for lowering said arm to allow said reproducing mechanism to engage the record.

89. In a talking machine, a turntable, means for automatically supplying records to said turntable and removing the same therefrom, comprising a record carrier, a vertically reciprocatory receptacle having a series of compartments or divisions for the records and means for moving said receptacle to bring each division successively opposite the record carrier.

90. In a talking machine, the combination with a record support for talking machine records, of a magazine for holding talking machine records, means for transferring records from said magazine to said support, a motor for actuating said support and an auxiliary motor for actuating said record transferring means.

91. In a talking machine, the combination with a rotatable record support and a reproducer coöperating therewith, of a record magazine bodily shiftable to bring the records thereon adjacent said record support, record shifter mechanism, means for automatically actuating said record shifter mechanism to move records to and from said magazine, means for disengaging the shifted record from said shifter mechanism, and mechanism for automatically raising the reproducer and for shifting the same to start-



ing position in engagement with the record on said support.

92. In a talking machine, the combination with a turn-table for rotating disk records, and a sound box cooperating therewith, of a record magazine vertically shiftable to bring the records thereon adjacent said turn-table, shifter mechanism for moving records to and from said magazine, means for disengaging the shifted record from said mechanism and for positioning the same upon said turn-table, a shifter mechanism for raising and lowering the sound box and for moving the same to starting position in relation to the record on the turn-table, and means for automatically actuating said record and sound box shifter mechanisms and said record disengaging means.

93. In a talking machine, the combination with a horizontal turn-table for rotating disk records and a cooperating sound box, of a record magazine vertically movable to bring the records thereon adjacent said turn-table, shifter mechanism for moving records to and from said magazine and into and out of operative position upon said turn-table, shifter mechanism for moving said magazine step by step to bring the records thereon into engagement with said record shifter mechanism, and means for automatically actuating said magazine and record shifter mechanisms.

94. In a talking machine, the combination with a rotatable record support and a cooperating reproducer, of a record magazine bodily shiftable to bring any record thereon adjacent said support, shifter mechanism for automatically moving the records to and from said magazine and into and out of operative position upon said record support and for shifting said reproducer to starting position, manually operable devices for initiating the operation of said turn-table and said shifter mechanism and means controlled by the operation of said turn-table for preventing the operation of said initiating devices during the reproduction of a record.

95. In a talking machine, the combination with a horizontal turn-table and traveling sound box cooperating therewith, of a record magazine vertically shiftable to bring the records thereon adjacent said turn-table, shifter mechanism for automatically moving the records to and from said magazine and into and out of operative position upon said turn-table, shifter mechanism for automatically raising and lowering said sound box and for moving the same to starting position, manually operable devices for initiating the operation of said turn-table and said automatic shifter mechanisms, automatic stop devices for arresting the operation of said shifter mechanisms and said turn-table,

and means controlled by the operation of said turn-table for preventing the operation of said shifter mechanisms during the reproduction of a record.

96. In a talking machine, the combination with a rotatable record support of a cooperating sound box, a horizontally and vertically movable supporting arm for said sound box, a record magazine bodily movable to bring the records therein adjacent said support, a needle magazine, shifter mechanism for automatically moving the records between said record magazine and said support, shifter mechanism for automatically raising and lowering said reproducer and moving the same to starting position, shifter mechanism for automatically providing the reproducer with a new needle from said needle magazine, and means for actuating said automatic shifter mechanisms at each operation of the machine.

97. In a talking machine, the combination of a turn-table for rotating disk records and a cooperating sound box, of shifter mechanism for automatically moving the records to and from said turn-table, means cooperating with said turn-table for disengaging the shifted record from said shifter mechanism, and a second shifter mechanism for automatically raising and lowering said sound box, for returning the same to starting position and changing the reproducing needle thereof.

98. In a talking machine, the combination of a rotatable record support and a cooperating reproducer, a record magazine, means for shifting said magazine to bring the records thereon adjacent said support, shifter mechanism for automatically moving the records to and from said magazine and into and out of operative position upon said support, a second shifter mechanism for raising and lowering said reproducer and moving the same to starting position, manually operable means for initiating the operation of said support and said shifter mechanisms and means for automatically and successively arresting said shifter mechanisms and said support.

99. In a talking machine the combination with a rotatable record support and a cooperating reproducer, of two record magazines, shifter mechanism for moving a record from said turn-table to one of said magazines and for moving a new record in the other of said magazines to said turn-table, and a shifter mechanism for raising and lowering said reproducer and moving it to starting position.

100. In a talking machine, the combination with a rotatable record support and a cooperating reproducer, of a pair of record magazines, shifter mechanism for moving a record from said turn-table to one of said



magazines and for moving a new record from the other of said magazines to said turn-table, shifter mechanism for raising and lowering said reproducer and moving the same to starting position, actuating means for said turn-table and said shifter mechanisms, means for initiating the operation of said actuating means, and devices for automatically stopping said actuating means at the end of the reproduction of a record.

101. In a talking machine, the combination with a turn-table for disk records and a cooperating sound box, of a pair of magazines shiftable to bring the records thereon adjacent said turn-table, a shifter mechanism for moving a record from said turn-table to one of said magazines and for shifting a new record from the other of said magazines to said turn-table, shifter mechanism for raising and lowering said sound box and for moving the same to starting position, actuating means for said turn-table and for said shifter mechanisms, and means for automatically stopping said actuating means at the end of the reproduction of a record with the record in place upon said turn-table.

102. In a talking machine, the combination with a rotatable record support and a cooperating reproducer, of a record magazine, means for automatically shifting records between said magazine and said support, means for automatically moving said sound box to starting position, a motor for actuating said support and an auxiliary motor for actuating said record and said sound box shifting means.

103. In a talking machine, the combination with a rotatable record support and a cooperating reproducer, of a record magazine shiftable to select any one of the records therein, and means for automatically moving the selected record from said magazine to said support and for automatically shifting said sound box to starting position.

104. In a multiple record talking machine, the combination with a rotatable record support and a cooperating reproducer, of a magazine, shifter mechanism for automatically shifting a record from said magazine to said support and back to said magazine, and means for moving said magazine relatively to said shifter mechanism.

105. In a multiple record talking machine, the combination with a rotatable record support and a cooperating reproducer, of a record magazine, means for automatically advancing said magazine as a whole to bring successive records adjacent said record support, and means for shifting a record from said magazine into playing position upon said support.

106. In a multiple record talking machine,

the combination with a rotatable record support and a cooperating reproducer, of a record magazine, means for automatically advancing said magazine as a whole to bring successive records therein adjacent said record support, and means for automatically shifting a record from said magazine to said support and for automatically moving said reproducer to starting position.

107. In a talking machine, the combination with a rotatable record support and a cooperating sound box, of mechanism for placing a record on or moving it from said support, a vertically movable guide for said sound box, and means for automatically shifting said guide to raise and lower said sound box to permit the changing of records upon said support, said sound box being arranged to shift laterally along said guide back to starting position.

108. In a talking machine, the combination with a horizontal turn-table of a cooperating sound box, a horizontally and vertically movable supporting arm whereon said sound box is mounted, shifter mechanism for automatically moving records into and out of playing position upon said turn-table, a vertically movable guide for said sound box arm, and means for automatically shifting said guide to raise and lower said sound box, to permit the interchange of records upon said turn-table, said sound box being arranged to move along said guide back to starting position.

109. In a talking machine, the combination with a rotatable record support, and a cooperating reproducer, of a magazine, a plurality of records therein, means for shifting said magazine back and forth to bring the records adjacent said support, shifter mechanism for automatically moving the records to and from said support and for automatically shifting said reproducer to starting position, means for disengaging the shifted record from said shifter mechanism, and means for preventing the movement of said magazine, when a record is removed therefrom.

110. In a talking machine, the combination with a rotatable record support, and a cooperating reproducer, of a record magazine, a rotatable shaft connected to said magazine for shifting the same back and forth to select a record, and shifter mechanism for automatically moving the selected record to and from said support and for automatically moving said reproducer to starting position.

111. In a talking machine, the combination with a rotatable record support and a cooperating reproducer, of a record magazine, a rotatable shaft, a stepped heart-shaped cam on said shaft connected to said magazine to shift the same back and forth step-by-step to select a record, and means for



shifting the selected record to and from said support and for moving said reproducer to starting position.

112. In a talking machine, the combination  
5 with a turn-table for rotating disk records and a cooperating sound box, of a record magazine, means for shifting the same back and forth to select a record, a needle maga-

zine, and automatic shifter mechanism for moving the selected record to said turn- 10 table, changing the needle of said sound box and moving the latter to starting position.

JOHN GABEL.

Witnesses:

HARRY L. CLAPP,  
KATHARINE GERLACH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



PHONOGRAPH DISK RECORD,  
#1,134,774----F. W. Thomas,  
Patented-April 6, 1915.  
Filed-July 28, 1914.

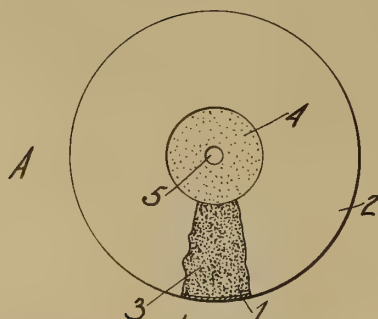


F. W. THOMAS.  
 PHONOGRAPH DISK RECORD.  
 APPLICATION FILED JULY 28, 1914.

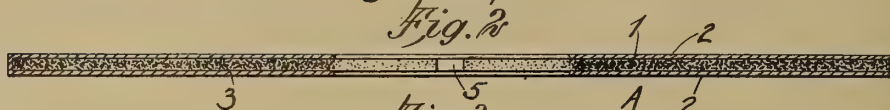
1,134,774.

Patented Apr. 6, 1915.

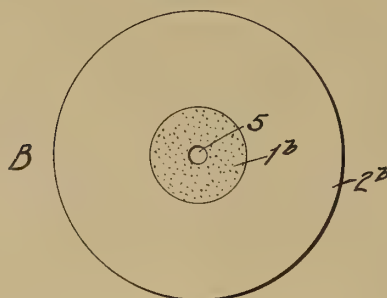
*Fig. 1*



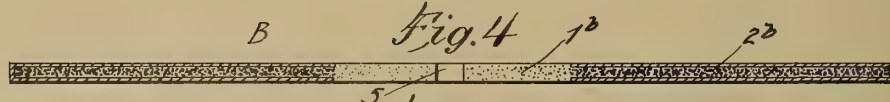
*Fig. 2*



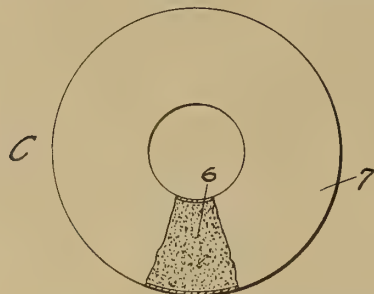
*Fig. 3*



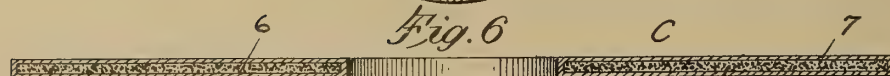
*Fig. 4*



*Fig. 5*



*Fig. 6*



WITNESSES

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*C. Bradway*

INVENTOR

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# UNITED STATES PATENT OFFICE.

FREDERIC W. THOMAS, OF NEW CITY, NEW YORK.

## PHONOGRAPH DISK RECORD.

1,134,774.

Specification of Letters Patent.

Patented Apr. 6, 1915.

Application filed July 28, 1914. Serial No. 853,607.

*To all whom it may concern:*

Be it known that I, FREDERIC W. THOMAS, a citizen of the United States, and a resident of New City, in the county of Rockland and State of New York, have invented a new and Improved Phonograph Disk Record, of which the following is a full, clear, and exact description.

This invention relates to phonograph disk records.

In disk records now in use and heretofore proposed there are certain inherent objections which it is the general object of the present invention to overcome by the production of a record which will give out mellow and pleasing sounds, do away with false, high notes, screechy and sharp noises, give a truer and more natural reproduction of sounds, and reproduce the human voice and other sounds more naturally. These results are unattained in the present disk records, owing to the fact that the disk body is of a hard, resonous nature. By the present invention the body of the record is permanently soft, yielding or cushiony, and hence non-sonorous, so that a more natural reproduction of sounds is possible without screechy noises or sharp notes.

In carrying out the invention the body of the record is made of a pad of felt, wood pulp or other fibrous material which is impregnated with a suitable material, such as asphalt or a composition in which the asphalt is the main constituent. This asphalt serves to impart permanent softness and non-resonance to the disk body, so that the record material applied to the surface thereof will be backed by a continuously soft cushion, whereby the objections to the present disk records are wholly overcome. A record of this type has the advantage of cheapness and simplicity of construction, indestructibility, stability sufficient to prevent cracking of the record material in the use and handling of the record, and superior tone qualities.

For a more complete understanding of the invention reference is to be had to the accompanying drawing taken in connection with the following description and appended claims.

In the accompanying drawing, which illustrates certain embodiments of the invention, and wherein similar characters of reference indicate corresponding parts in all the views, Figure 1 is a plan view of the improved disk record with a portion of the

record material broken away; Fig. 2 is an enlarged diametrical section; Fig. 3 is a plan view of a modified form of disk record; Fig. 4 is an enlarged diametrical section thereof; Fig. 5 is a plan view of a ring form of record; Fig. 6 is a diametrical section thereof.

Referring to the drawing, A designates a sound record of disk form which comprises a fibrous core or body 1 which has on one or both sides thereof the usual record material 2, so that in external appearance the record is like those in common use, except that at the center the fiber core or body 1 is exposed. This core may be made of wood pulp, felt or any other suitable material which has sufficient rigidity to support itself. The portion of the fibrous body 1 immediately under the record material 2 is in a permanently soft or non-resonant condition, due to the fact that it is impregnated with a suitable material, such as non-hardening asphalt or a composition in which asphalt or equivalent material is the principal ingredient. It is unnecessary to impregnate the central part of the disk where the record material does not appear, and this is brought out by the coarse and fine stippling, the coarsely stippled portion 3 being impregnated with the asphalt and the finely stippled portion 4 being unimpregnated. The fibrous material impregnated with asphalt and exposed for a long time to the action of the weather, retains its softness for an indefinite length of time, and consequently by inclosing the impregnated portion of the fibrous body with the practically non-porous record material, the fibrous body of the record will be practically of permanent softness or non-resonance.

In the record B shown in Figs. 3 and 4, the fibrous body 1<sup>b</sup> is rolled or pressed throughout that portion which is to receive the record material, and on this portion the record material 2<sup>b</sup> is applied after the fibers have been thoroughly impregnated with asphalt or the like. The record material is flush with the center of the fibrous body of the disk, making the latter of the same thickness throughout.

In the form of the invention shown in Figs. 1 to 4 inclusive there is a central aperture 5 to receive the post of the turntable of the phonograph, but the record may be made of annular form, as shown in Figs. 5 and 6. In this case the record C has an an-

nular body or core 6 of fibrous material that is impregnated throughout with asphalt or a compound thereof, and the record material 7 covers the upper and lower surfaces and the inner and outer edges, thereby wholly incasing the core.

In making a record the softening material, which may be hot asphalt, asphalt with volatile oils, asphalt and twenty or twenty-five per cent. tar in hot condition, or asphalt and hot coal tar with volatile oils, is applied to the fibrous body or pad either by dipping the latter in the material or spreading the material on the opposite faces thereof until the fibers are thoroughly impregnated. The pad is then dried, but in drying the pad remains soft, cushiony and non-sonorous. The record material is then applied to the impregnated part of the pad, and since this material is hot when applied there will be a firm adhesion between the pad and record material, the asphalt also contributing to this result, so that there is no danger of the record material scaling or separating from the pad.

From the foregoing description taken in connection with the accompanying drawing, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have de-

scribed the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as are within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A sound record comprising a fibrous body, and a record material thereon, said body being impregnated with a non-hardening asphaltic material serving to render the body permanently non-sonorous and to cement the record material to the body.

2. A sound record comprising a fibrous body impregnated solely with asphalt, and record material applied to the impregnated body.

3. A sound record comprising a fibrous body impregnated with a non-hardening asphalt, and a surface layer of hard record material connected with said body.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERIC W. THOMAS.

Witnesses:

CHATTEN BRADWAY,  
GEORGE H. EMSLIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



DIAPHRAGM SETTING FOR PHONOGRAPH REPRODUCERS,  
# 1,134,775-----F. W. Thomas,  
Patented-April 6, 1915.  
Filed-July 28, 1914.

F. W. THOMAS.  
DIAPHRAGM SETTING FOR PHONOGRAPH REPRODUCERS.  
APPLICATION FILED JULY 28, 1914.

1,134,775.

Patented Apr. 6, 1915.

Fig. 1

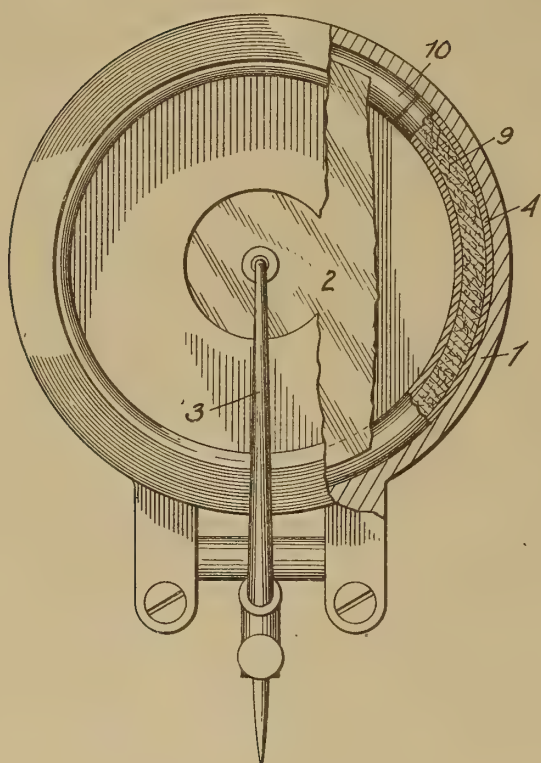


Fig. 2

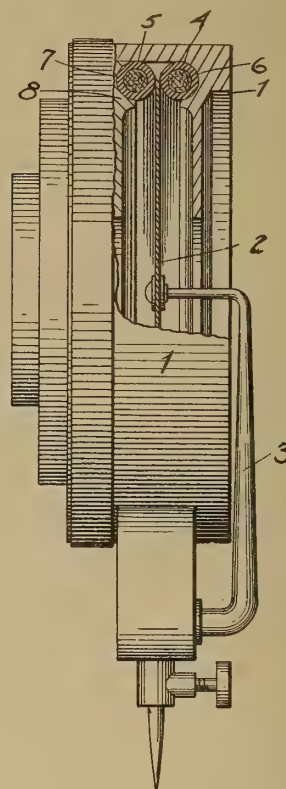


Fig. 3

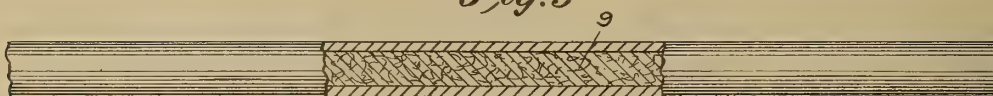
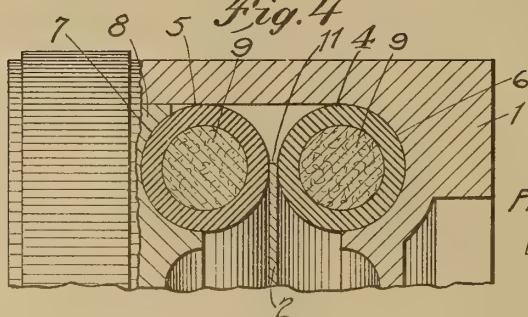


Fig. 4



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C. Broadway

INVENTOR  
Frederic W. Thomas  
BY Munn & Co  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

FREDERIC W. THOMAS, OF NEW CITY, NEW YORK.

## DIAPHRAGM-SETTING FOR PHONOGRAPH-REPRODUCERS.

1,134,775.

Specification of Letters Patent. Patented Apr. 6, 1915.

Application filed July 28, 1914. Serial No. 853,608.

*To all whom it may concern:*

Be it known that I, FREDERIC W. THOMAS, a citizen of the United States, and a resident of New City, in the county of Rockland and State of New York, have invented a new and Improved Diaphragm-Setting for Phonograph-Reproducers, of which the following is a full, clear, and exact description.

This invention relates to sound reproducers and recorders and deals more particularly with the mounting of the diaphragm.

The invention has for its general object to improve the construction of devices of the character referred to so as to be more satisfactory in operation, comparatively simple and inexpensive to produce and so designed as to be uniformly effective for an indefinite time and irrespective of temperature and weather conditions.

The invention has for its specific object to provide an improved diaphragm setting whereby the full tonal effects are obtained from the vibrations of the diaphragm and superior reproduction rendered possible, this through the use of novel, simple and reliable gaskets between which the peripheral edge of the diaphragm is clamped with a uniform and practically permanent compression, so that rattling of the diaphragm is positively prevented.

With such objects in view, and others which will appear as the description proceeds the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and claims appended hereto.

In the accompanying drawing, which illustrates an embodiment of the invention, and wherein similar characters of reference indicate corresponding parts in all the views, Figure 1 is a front view of a sound reproducer with portions broken away to illustrate the details of construction; Fig. 2 is a side view with portions in section; Fig. 3 is a view of a piece of the gasket stock; and Fig. 4 is an enlarged sectional view through the gaskets and the peripheral portion of the diaphragm.

Referring to the drawing, 1 designates the body of the reproducer, recorder or equivalent device, and in this body is a suitable metallic or other diaphragm 2 to which the stylus bar 3 is connected in the usual man-

ner, and within the body 1 are annular gaskets 4 and 5 that engage opposite sides of the diaphragm 2 and are set respectively in approximately semi-circular seats or annular grooves 6 and 7 in the body 1 and clamping ring 8.

The novel features of the invention reside in the manner of positioning the diaphragm with respect to the annular gaskets 4 and 5 and the construction of the gaskets themselves. The gaskets in the present instance are shown as of circular cross-section and they are in the form of rubber tubes filled with a fibrous core 9, which, together with the rubber of the tubular gaskets, forms an excellent setting for the diaphragm, as the tension or resiliency of the gaskets will be maintained indefinitely and grip the diaphragm with a uniform pressure. In other words, after the gaskets have been subjected to the desired tension there will be no collapsing of the gaskets, as is now commonly the case with present reproducers, so that there is no danger of the diaphragm becoming loose and rattling. The gasket stock can be made in any desired length, as rubber tubing is now made, but the tubing will be formed around the fibrous core of yarn or any other suitable material, and this stock is cut into the desired length, so that when placed in the seats 6 and 7 of the reproducer the ends of each piece will meet, as shown at 10, Fig. 1, thereby forming a continuous annular support for the diaphragm. As shown in Figs. 1 and 4, the diaphragm is of such diameter that the peripheral edge 11 thereof is coincident with the plane of the longitudinal centers of the gaskets, so that only the very edge of the diaphragm will be gripped, and no portion of the diaphragm will project outwardly beyond the lines of contact between the diaphragm and gaskets. Thus, the diaphragm is made of minimum size and the full effects of the vibration are utilized in sound reproduction.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be



made when desired as fall within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters  
5 Patent:

1. The combination of a diaphragm and a gasket comprising a tube of yielding material, and a core in the tube for preventing collapsing thereof, said core including a  
10 fibrous material.

2. The combination of a sound box, a diaphragm therein, and gaskets between which the diaphragm is clamped, each gasket comprising a tube of non-sonorous material, and  
15 fibrous material within the tube and in direct contact with the inner surface of the latter.

3. The combination of a sound box, a diaphragm therein, and gaskets between which

the diaphragm is clamped, said gaskets each comprising a tube of rubber and a filling of  
20 fibrous material therein.

4. The combination of a sound box, a diaphragm and a gasket comprising a flexible strip adapted to be curved into circular form to have its ends meet, said strip consisting  
25 of a rubber tube, and a core preventing collapsing thereof, the core embodying fibrous material.

In testimony whereof I have signed my name to this specification in the presence of  
30 two subscribing witnesses.

FREDERIC W. THOMAS.

Witnesses:

CHATTEN BRADWAY,  
GEORGE H. EMSLIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH,

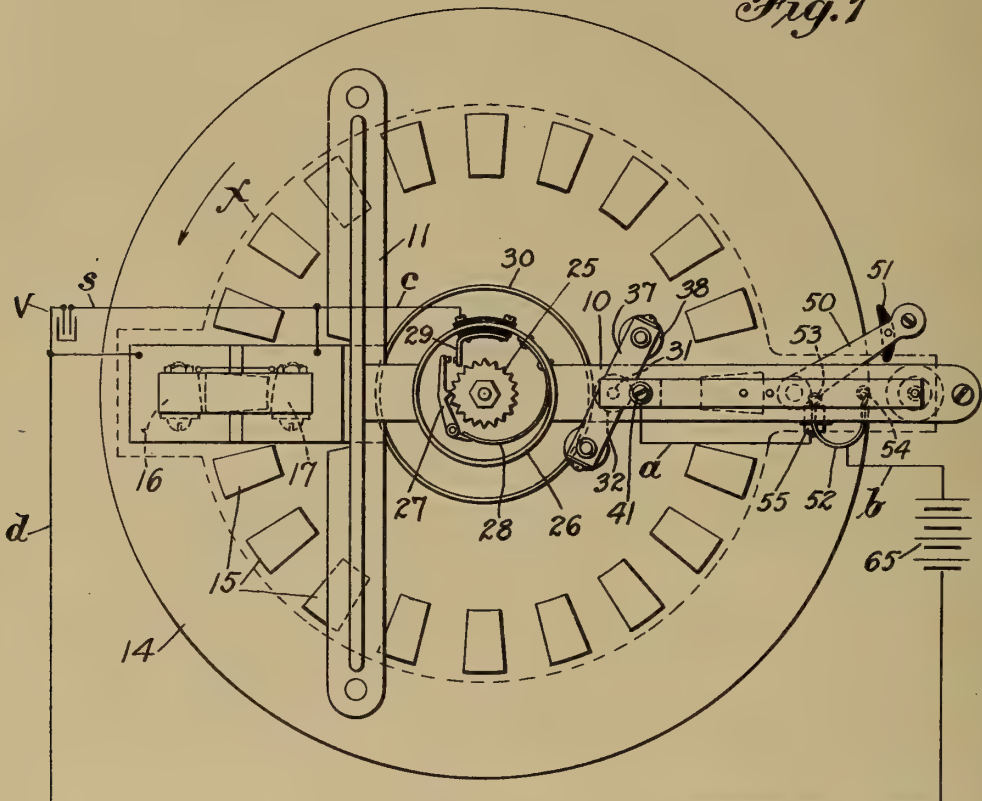
# 1,136,739-----G. S. Tiffany,  
Patented-April 20, 1915.  
Filed-August 7, 1914.

G. S. TIFFANY.  
 PHONOGRAPH.  
 APPLICATION FILED AUG. 7, 1914.

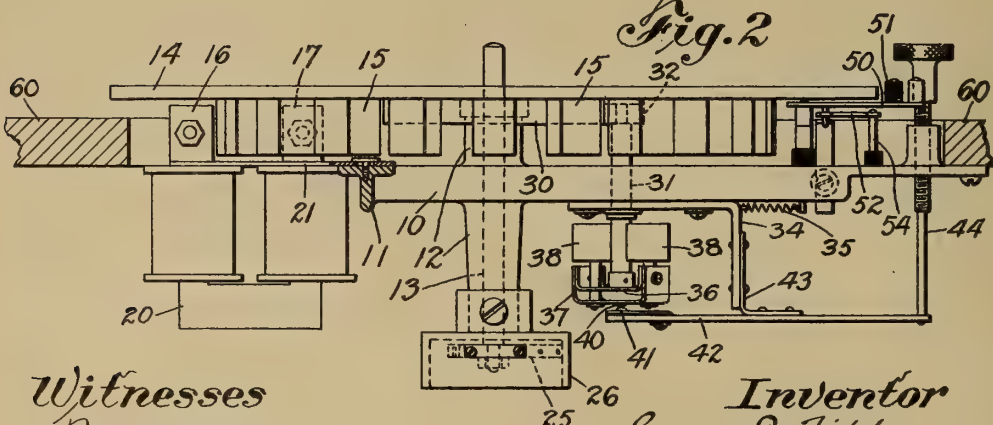
1,136,739.

Patented Apr. 20, 1915.  
 2 SHEETS-SHEET 1.

*Fig. 1*



*Fig. 2*



Witnesses  
 Frank H. Vick  
 Leo M. Vail

Inventor  
 George S. Tiffany  
 By Arthur L. Kent  
 his Att'y





G. S. TIFFANY.

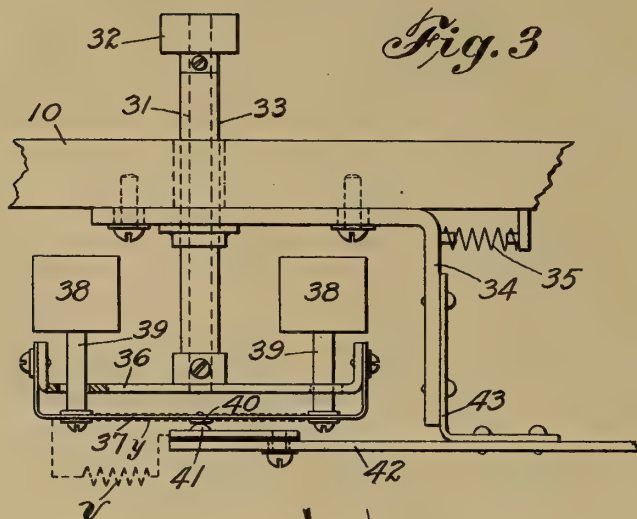
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APPLICATION FILED AUG. 7, 1914.

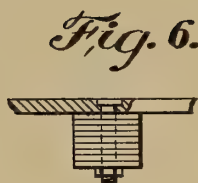
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Patented Apr. 20, 1915.

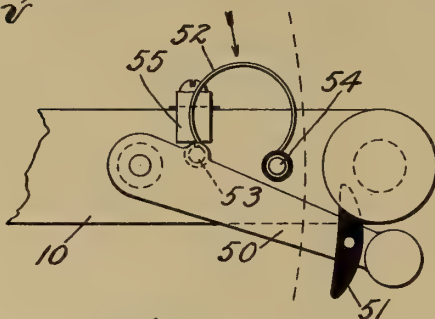
2 SHEETS-SHEET 2.



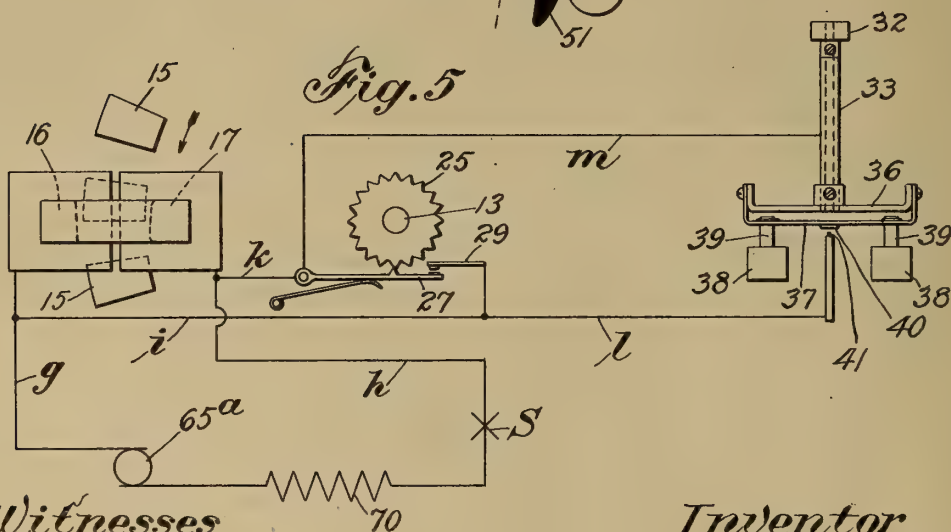
*Fig. 3*



*Fig. 6.*



*Fig. 4*



*Fig. 5*

Witnesses  
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 As Duval

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# UNITED STATES PATENT OFFICE.

GEORGE S. TIFFANY, OF SUMMIT, NEW JERSEY.

## PHONOGRAPH.

1,136,739.

Specification of Letters Patent.

Patented Apr. 20, 1915.

Application filed August 7, 1914. Serial No. 855,574.

*To all whom it may concern:*

Be it known that I, GEORGE S. TIFFANY, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Phonographs, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to electrically driven phonographs, and more especially to the motor apparatus of phonographs of that type in which the record body is in the form of a flat plate or disk.

The object of the invention is to provide an electrically driven phonograph by which the record body shall be moved with the greatest possible constancy of speed and smoothness of operation and without vibration or noise, thereby securing the best results both in the character of records made and in the clearness and quality of reproduction.

The invention aims further to secure these results with a motor mechanism which is extremely simple in construction and efficient in operation, and which shall operate with very small consumption of current.

To these ends and to attain other objects which will hereinafter appear, the invention consists in the features of construction, arrangement and combination of parts which will appear from the description following, and which are particularly pointed out in the claims.

In the accompanying drawings:—Figure 1 is a bottom plan view of an approved embodiment of the invention as applied to a phonograph of the disk record type, the circuit connections being indicated diagrammatically: Fig. 2 is a side elevation of the apparatus shown in Fig. 1, most of the circuit connections being omitted; Fig. 3 is a side elevation, on a larger scale than Figs. 1 and 2, of a part of the motor apparatus showing the governor by which the speed of the record support is controlled. Fig. 4 is a detail view on the scale of Fig. 3 of the combined starting and stopping brake and switch. Fig. 5 is a diagrammatic view illustrating another arrangement of the circuit connections and a modified construction of the governor. Fig. 6 is a detail view show-

ing one of the armature bodies of the most desirable form.

Referring first to Figs. 1 to 4, the operating parts of the apparatus as shown are carried by a T-shaped supporting frame having a main stem 10 and a cross bar 11. The stem 10 has upwardly and downwardly extending bosses 12 formed with a through opening to receive the shaft 13 of the plate or disk 14 which forms the table or support for carrying the record disk, and which for a reason which will appear hereinafter is best made of a suitable nonmagnetic material such for example as type metal. The usual ball bearing or other suitable anti-friction bearing may be provided between the table 14 and the upper face of the boss 12. Carried by the table 14 are a number of armature bodies 15 arranged equidistant from each other and at equal distances from the axis of rotation of the table. These armature bodies most desirably project downward from the under side of the table and may be formed each of a single block of iron or other magnetic material, but most desirably the bodies are each made up of a plurality of plates, best of soft iron, bolted rigidly together and to the table as shown in Fig. 6. As the table rotates the armature bodies 15 pass between upwardly extending polepieces 16 and 17 of an electromagnet 20 by which the armature bodies are successively attracted to give a succession of rotating impulses to the table. The magnet may be of ordinary U-shaped type as shown and supported by a plate 21 extending from the cross piece 11 of the carrying frame. The circuit to the magnet 20 is controlled according to the rotation of the table 14 so that unless the magnet circuit is otherwise broken the magnet will be energized as each of the armature bodies approaches its polar extensions and will be deenergized as each armature body reaches or approaches a central position with respect to the polepieces. For so controlling the magnet circuit in the construction shown, a circuit making and breaking device is provided, the operating element of which is a toothed wheel 25 secured on the lower end of the shaft 13 within a housing formed by a cup 26 which extends downward from the lower end of the downwardly extending boss 12. A piv-



oted lever or dog 27 is mounted within the housing and is spring pressed by spring 28 to move its free end into engagement with a contact plate 29 which is mounted inside the housing and insulated therefrom. The lever 27 is formed with a projection extending toward the toothed wheel 25 in position so that when the projection enters between adjacent teeth of the wheel the outer end of the lever is permitted to engage the contact plate 29 and that as the wheel rotates the lever will be moved outward away from the plate 29 as successive teeth of the wheel engage the projection of the lever and force it outward. The lever 27, housing 26 and T-shaped supporting frame, including the boss 12, may all be of metal and in the construction shown are included in the motor circuit.

The speed of rotation of the record carrying table is controlled by a circuit-controlling governor which is driven from an annular rib or flange 30 extending downward from the under face of the table concentric with the axis of rotation and most desirably within the circular row of armature bodies. This flange drives a governor shaft 31 through a friction wheel 32 carried by the shaft. The governor shaft is mounted in a bearing sleeve 33 which is carried by an angle piece or bracket 34 secured to the stem 10 of the supporting T frame, the bearing sleeve extending above and below the horizontal arm of the bracket and passing in the construction shown through the stem 10. The bracket is mounted, as by means of screws passing through slightly elongated openings therein, so as to be capable of movement to carry the friction wheel 32 toward and from the annular flange 30 to provide for adjustment to secure suitable pressure of the friction wheel against the driving flange. Most desirably automatic adjustment is secured by means such as a spring 35 tending to move the bracket to hold the friction wheel yieldingly against the face of the driving flange. The shaft 31 carries at its lower end a cross bar 36 secured to turn with the shaft and which carries a flat spring 37 extending parallel to and a short distance below the lower face of the bar and secured to the bar at its ends, the ends of the spring in the construction shown being bent upward and secured to upwardly bent ends of the bar. Except for the connection with the ends of the bar, the spring is out of contact with and spaced slightly away from the bar so as to be capable of being flexed to cause its central portion to move toward and from the bar. The spring carries a pair of centrifugal weights 38 by means of stems 39 rigidly secured to the spring and which in the arrangement shown in Figs. 2 and 3 extend upward from the spring one on either side of the axis of ro-

tation, the stems passing through clearance openings in the bar. When the shaft 31 is rotated, as the speed of rotation increases, the centrifugal weights tend more and more to move outward and to flex the spring 37 and bends its middle portion upward toward the bar 36. The spring is in electrical connection with the supporting frame stem 10 and carries at its central or axial point a contact terminal 40 which normally rests against a cooperating stationary contact piece 41 to close the motor circuit at this point.

By the upward movement of the middle portion of the spring under the influence of the centrifugal weights, the contact 40 is carried away from the stationary contact 41 and the motor circuit is opened at this point when the governor exceeds a certain speed of rotation, and the speed of the governor at which the motor circuit is thus broken depends on the position of the contact 41. To provide for varying the speed of rotation to which the table will be held by the action of the governor, the stationary contact 41 is made adjustable, being in the construction shown carried by but insulated from a bar 42 which is attached by means of a spring plate 43 to the downwardly extending arm of the bracket 34. The spring tends to throw the contact carrying end of the bar down away from the governor spring, that is, to separate the contacts, and the bar is held in position by a screw rod 44 which is mounted to turn in a threaded bearing carried by the stem 10 of the supporting frame and the reduced lower end of which extends through an opening in the outer end of the bar and is formed with a shoulder to bear on the bar. The upper end of the screw rod has a knurled head by which it may be turned. By turning the screw rod to move it downward the bar is adjusted to raise its contact 41 into firmer engagement with the governor spring contact 40 so that a higher speed of rotation of the governor, with corresponding increase in speed of the table 14, is required to cause an increase in the centrifugal force exerted sufficient to bend the spring 37 enough to carry the contact 40 away from the contact 41; and, contrarily, by turning the screw rod in the opposite direction the inner end of the bar will be moved downward to lower the contact 41, and a lesser speed of rotation will serve to separate the contacts and the speed of rotation of the table will thus be reduced.

Contacts 40 and 41 are most desirably of dissimilar metals such as silver and nickel. In order to diminish any sound resulting from the vibration of the governor spring 37, I find it desirable to apply a coating of fabric, such as ordinary adhesive tape, to one or both faces of the free portion of the spring, as by folding a piece of adhesive



tape about the spring on each side of the contact 40 as indicated by the dotted line *y* in Fig. 3.

The governor is extremely sensitive and reliable in operation. The contact terminals are self cleaning, and there is practically no friction loss between the centrifugal force of the weights and the resistance of the spring 37. A very sensitive balance is, therefore, maintained between these two forces. So responsive is the device to very slight changes in speed that the contacts 40 and 41 are maintained in tremulously intermittent engagement while the motor is in normal operation, with the result that an effectively constant speed is maintained; and it may be that even without complete separation of the contacts continuing through whole rotations, the governor, by controlling the meeting pressure of the contacts and thereby varying and adjusting the relative or proportionate time of engagement of the actual contacting points of the meeting faces of the contacts, maintains the desired constant speed of the table by adjusting the mean strength of the current flowing to the magnet when the circuit is closed by the interrupting lever 27. The phonograph is started and stopped by means of a combined brake and switch which also acts to give a starting impulse to the table when moved to release the table and close the motor circuit. This device comprises a stop lever 50 which is pivotally mounted on but insulated from the stem 10 of the supporting frame at a point inside of the periphery of the table and carries a pivoted brake shoe 51 which may be brought into engagement with the edge of the table by movement of the lever in the direction of rotation of the table. A bow spring 52 is pivotally connected at one end to a pin 53 carried by the arm 50 and at the other end to a post 54 extending upward from the supporting frame stem 10. The ends of the spring 52 tend to move apart, and the pin 53 and post 54 are in such relation to the pivotal point of the stop lever that when the lever is in the position for operation of the phonograph with the brake shoe removed from the edge of the table as shown in Figs. 1 and 4, the tension of the spring will tend to hold the arm in this position, and that when the arm is moved to apply the brake the pin 53 will move across the line between the pivotal axis of the arm and the post 54 so that the spring will then act on the arm in the direction to carry and hold the brake shoe against the edge of the table. As the brake shoe moves into engagement with the edge of the table in the direction of movement of the table edge, any continued turning of the table after the brake shoe comes into engagement therewith has the tendency to tighten the brake. A contact piece 55 mounted on but

insulated from the supporting frame stem 10 serves as a stop for the lever 50 when in the position shown in Figs. 1 and 2 after it has been moved to release the table, and in this position, in the construction shown, the pin 53 engages this contact 55. The post 54 is insulated from the supporting frame stem 10 in order that the pin 53 and parts in connection therewith shall be insulated from the supporting frame. The contact piece 55 is electrically connected as by wire *a* with the governor contact piece 41 as shown in Fig. 1, and connection from the pin 53 which serves as a contact member cooperating with the contact piece 55 is made by wire *b*, which as shown may be connected to the spring 52. The motor circuit will therefore be opened by separation of the pin 53 and contact piece 55 when the stop lever is moved to apply the brake, and will be closed at this point when the stop lever stands in position for operation of the phonograph as shown in the drawings. When the stop lever is moved to release the table, the movement of the brake shoe as it leaves the edge of the table gives a slight starting impulse to the table. This slight impulse or movement, which with the construction shown is a backward movement, serves to insure the starting of the table when the brake is released and the motor circuit closed, insuring operation of the motor apparatus shown by moving the table out of any dead position in which the motor circuit would be broken between the contact piece 29 and the lever 27.

The supporting frame may be mounted in any suitable manner, but it is especially designed so that the stem 10 and cross bar 11 may be screwed or otherwise secured directly to the under side of the usual board or plate of the phonograph cabinet directly above which the record carrying table stands. Such plate is shown and marked 60 in Fig. 2 and is formed with a circular opening of a size sufficient to receive the circular row of armature bodies and having extensions at opposite sides to accommodate the motor magnet and the parts of the starting and stopping device respectively as indicated by dotted line *x* in Fig. 1.

In the operation of the machine, assuming that the stop lever 50 is in position for operation of the phonograph as shown in the drawings, and that the table 14 is in rotation, in the position of the table shown in Fig. 1 an armature body 15 has completely entered the space between the magnet poles and the dog 27 has been moved by the toothed wheel 25 out of engagement with the contact piece 29 to open the motor circuit at this point. Rotation of the table then continuing, the toothed wheel 25 turns with the table and the engaging tooth of the dog enters between teeth of the wheel and



the end of the dog comes into engagement with the contact 29, closing the motor circuit at this point and establishing the circuit as follows:—From one pole of battery 65 by wire *b*, spring 52, pin 53, contact 55, wire *a*, contact 41, contact 40, spring 37, bar 36, shaft 31, sleeve 33, bracket 34, supporting frame stem 10, housing 26, dog 27, contact piece 29 and wire *c* to the magnet winding and thence by wire *d* back to the other pole of the battery. The magnet being thus energized will attract the approaching armature body and draw it into the space between the magnet poles, and the dog 27 will then be moved by the next tooth of the wheel 25 away from the contact 29, thus opening the circuit again at this point and deenergizing the magnet as the armature body comes to central position between the magnet poles. As this armature body by the continued rotation of the table is moved beyond the magnet poles and the next armature body approaches the magnet, the dog 27 again comes into engagement with the contact 29 to close the circuit and the magnet is again energized to cause it to attract the approaching armature body, and this action is repeated to give successive impulses to the table as the armature bodies successively approach the magnet. Such successive impulses, which follow closely one after the other because of the large number or close arrangement of the armature bodies, gradually accelerate the speed of rotation of the table. As the table rotates, it drives the governor through engagement of the annular flange 30 with the friction wheel 32, and as the speed of the governor increases with increase in speed of the table the centrifugal weights 38 of the governor tend more and more to bend the governor spring 37 upward until finally when a certain speed is reached, dependent on the adjustment of the governor, the governor comes into action and by controlling the magnet circuit prevents further increase in speed and maintains the desired constant speed of the table. By reason of the extreme sensitiveness of the governor as hereinbefore pointed out, a very close control of the driving power is secured with the result that variations in the speed of rotation of the table are practically eliminated and an effectively constant speed of rotation maintained. I find that when operating with direct current there is some advantage in connecting a non-inductive resistance across the governor contacts, as indicated by dotted lines at *v* in Fig. 3, to prevent complete cutting off of current from the magnet by operation of the governor.

The rotation of the table may be stopped when desired by moving the stop lever 50 to throw the brake shoe into engagement with

the edge of the table and at the same time to open the motor circuit by moving the pin 53 away from the contact piece 55; and to start the rotation of the table it is only necessary to move the stop lever back to the position shown in the drawings, thereby releasing the table, closing the circuit between the pin 53 and the contact piece 55, and imparting a starting impulse to the table. By turning the screw rod 44 to adjust the bar 42 the speed of rotation which will be maintained by the governor may be varied and adjusted as desired.

It is of utmost importance for best results, not only that the record body shall be moved at a constant uniform speed, but also that the operation of the phonograph shall be without vibration of the record body and also without any kind of vibration of the parts of the apparatus which would result in noise. An important feature of my construction contributing largely to the elimination of all vibration and suppression of noise is that the armature bodies carried by the table are, as they come within the influence of the magnet, balanced magnetically in the magnetic field. This result is secured in the apparatus shown by causing the armature bodies to pass successively between two pole pieces of the magnet, the parts being arranged so that the outward and inward pull on each armature body as it approaches the magnet shall balance each other to cause the resultant pull of the combined forces acting on the armature body to be substantially in the direction of movement of the body and of the portion of the table by which it is carried, and so that the pull of the magnet shall not cause any flexing or bending of any part of the apparatus. In order to secure to the greatest extent such balancing of the armature bodies in the magnetic field, the bodies are made wider at their outer ends in the direction of movement than at their inner ends, or with their sides substantially radial with respect to the axis of rotation, and the magnet is mounted so as to be adjustable radially with respect to the armature bodies. Such adjustment of the magnet is provided for in the apparatus shown by adjustably securing the magnet carrying plate 21 to the supporting frame as indicated in Fig. 2. This adjustment of the supporting plate 21 may also provide for a slight swinging or angular adjustment of the magnet in the plane of movement of the armature bodies to move its outer polepiece forward or backward with respect to its inner polepiece. In order to prolong somewhat the pull on the armature body as it first enters between the polepieces of the magnet, the inner faces of the polepieces are most desirably formed as shown to slant outward slightly toward the side at which



the armature bodies enter. It is also desirable that the armature bodies shall be short solid bodies rigidly secured to the table, that the magnet polepieces shall extend reasonably close to the under face of the table so that the pull on the armature body shall be exerted in a plane close to the table, and that the table itself shall be of reasonably heavy and rigid construction to rigidly support the armature bodies and resist the slight bending strain resulting from the pull of the magnet on the armatures in the apparatus shown, and furthermore that the table shall be of non-magnetic material so as to avoid any downward pull by the magnet on the part of the table passing over it.

For eliminating the spark at the circuit breakers and for further avoiding noise and vibration in the operation of the phonograph by eliminating the sound and jar due to a sudden change in the magnetic state of the iron of the magnet, suitable means for delaying the demagnetization of the magnet is provided. A shunt circuit around the magnet, including means whereby the energizing flow of current or a principal part thereof is prevented from following the path through this shunt circuit serves such purpose. Such a shunt circuit is indicated by the wire *s* in Fig. 1, and in order to prevent the passage of the energizing flow of current through such shunt circuit and to provide a free effective path for the magnet discharge current, I connect in such circuit, when economy in current consumption is of prime importance as when the current is supplied from primary batteries and especially from dry cells, an electrolytic valve *V* which may consist of an aluminum plate and a lead plate immersed in a solution of ammonium phosphate. Such electrolytic valve or condenser acts in the shunt circuit as a flow-controlling valve, resisting flow of current in one direction but permitting with very little resistance an effective flow of current in the other direction. By suitably connecting the shunt circuit around the magnet, and including in it such a flow-controlling valve, the flow of current through the shunt from the energizing circuit is practically or effectively prevented, while the effective flow of the magnet discharge current in the opposite direction through the shunt meets with little, if any, resistance. Other forms of condensers which will effectively prevent the flow of the energizing current of comparatively low electro motive force, but which will not obstruct the effective flow of the magnet discharge current which is of comparatively high electro motive force, might be employed to approximate the results secured by the use of an electrolytic valve, and where economy in current consumption is not of importance, the elimina-

tion of sparking and suppression of noise and jar from the magnet discharge may be obtained by substitution of a non-inductive resistance in a closed shunt circuit.

Fig. 5 illustrates an arrangement of circuits with which the motor magnet is deenergized when the circuit interrupting dog or lever 27 is in engagement with the contact 29 or when the governor contact 40 is in engagement with the contact 41. As represented in this figure, the source of supply of current 65\* is connected directly with the magnet coils by wires *g* and *h*, except that the supply circuit thus formed includes a non-inductive resistance 70 to adjust the voltage on the magnet and the starting and stopping switch or other main controlling switch which is indicated at *S*. The circuit interrupting lever 27 and the contact piece 29 are connected in shunt with the magnet by wires *i* and *k*, with the result that when the lever 27 is moved away from the contact 29 and the shunt circuit thus opened, the magnet will be energized, but when the shunt circuit is closed by the lever 27 coming into engagement with the contact 29 most of the supply current will flow through the wires *i* and *k* of the shunt circuit rather than through the magnet since the resistance of the shunt circuit is very much less than the resistance of the magnet coils, and the magnet will therefore have little or no force and may be considered to be deenergized when the shunt circuit is closed. The shunt circuit, while deflecting the current from the magnet when it is closed, will also at the same time furnish a path of low resistance for the magnet discharge current.

The governor as shown in Fig. 5 is also connected in shunt across the wires *g* and *h* by wires *l* and *m* connecting respectively with the wires *i* and *k*, and is thus in parallel with the circuit interrupter formed by the lever 27 and contact piece 29 and it acts to prevent the flow of energizing current to the magnet in the same way as the circuit interrupter, that is, by closing a shunt circuit across the magnet coils which being of less resistance than the magnet coils affords a path for the flow of most of the current. In order that the governor shall operate to close circuit between its contacts when the speed of operation is excessive, the stems 39 which carry the centrifugal weights 38 extend from the outer face of the governor spring 37 so that by the outward pull of the weights the middle portion of the spring is bent outward, or downward, to engage the contact 41 which normally stands out of engagement with the contact 40 carried by the spring. Otherwise, the governor is or may be the same in construction as shown in the other figures and as hereinbefore described.



It is to be understood that the invention is not to be limited to the exact construction of the apparatus and arrangement of circuits as shown in the drawings and to which the foregoing description has been largely confined, but that it includes changes and modifications thereof within the claims.

What is claimed is:

1. A phonograph comprising in combination a movable support for the sound record body, a plurality of armature bodies carried by said support, electro-magnetic means for attracting said armature bodies, the arrangement of said armature bodies and said electro-magnetic means being such that each armature body when attracted by the electro-magnetic means is balanced magnetically in the magnetic field, and means controlling said electro-magnetic means to cause it to attract said armature bodies in succession.

2. A phonograph comprising in combination a rotatable support for the sound record body, a plurality of armature bodies carried by said support and spaced equal distances apart, an electro-magnet for attracting said armature bodies having polepieces so arranged with respect to the path of movement of the armature bodies that each armature body in approaching the polepieces of the magnet shall be balanced magnetically in the magnetic field, and circuit controlling means for causing the magnet to attract the armature bodies in succession.

3. A phonograph comprising in combination a rotatable support for the sound record body, a plurality of armature bodies carried by the support and spaced equal distances apart, electro magnetic means for attracting said armature bodies comprising a pair of polepieces mounted so that each armature body shall come within the sphere of influence of both polepieces simultaneously, passing on one side of one polepiece and on the other side of the other polepiece, and circuit controlling means controlled according to the movement of the rotatable support for causing said electro-magnetic means to attract the armature bodies in succession.

4. A phonograph comprising in combination a rotatable table for carrying a sound record disk on the upper face thereof, a plurality of armature bodies carried by the table and projecting from the lower face thereof, said bodies being equidistant from each other and at equal distances from the axis of rotation of the table, electro-magnetic means for attracting the armature bodies comprising a pair of polepieces mounted so that as the armature bodies pass the electro-magnetic means in succession each armature body shall pass between and

be attracted by both the polepieces, and circuit controlling means for causing the electro-magnetic means to attract the armature bodies in succession.

5. A phonograph comprising in combination a rotatable table for carrying a sound record disk on its upper face, said table being formed of non-magnetic material, a plurality of armature bodies carried by the table and projecting from the under face thereof, electro-magnetic means for attracting the armature bodies comprising a pair of polepieces beneath the table in position such that as the armature bodies pass the electro-magnetic means in succession each armature body will pass between and be attracted by both the polepieces, and circuit controlling means for causing said electro-magnetic means to attract the armature bodies in succession.

6. A phonograph comprising in combination a rotatable support for the sound record body, a plurality of armature bodies carried by the support, electro-magnetic means for attracting said armature bodies comprising a pair of pole pieces mounted both on the same side of the axis of rotation of the support and so that the armature bodies shall pass between them, and circuit controlling means for causing said electro-magnetic means to attract the armature bodies in succession.

7. A phonograph comprising in combination a rotatable support for carrying the sound record body, a plurality of armature bodies carried by the support, electro-magnetic means for attracting said armature bodies comprising a pair of polepieces between which the armature bodies successively pass, means for causing a relative adjustment between the support and said polepieces to cause the armature bodies in approaching the polepieces each to be balanced magnetically in the magnetic field, and circuit controlling means for causing the electro-magnetic means to attract the armature bodies in succession.

8. A phonograph comprising in combination a rotatable table for carrying a sound record disk, a plurality of armature bodies carried by the table and projecting downward from the lower face thereof, an electro-magnet for attracting said armature bodies having a pair of polepieces between which the armature bodies successively pass, each armature body being simultaneously attracted by both polepieces, said magnet being mounted to be adjustable in position radially with respect to the path of movement of the armature bodies, and circuit controlling means for causing the magnet to attract the armature bodies in succession.

9. A phonograph comprising in combination a rotatable table for carrying a sound

record disk, a plurality of armature bodies carried by the table and projecting downward from the lower face thereof, an electro-magnet for attracting said armature  
 5 bodies having a pair of polepieces on the same side of the table axis and between which the armature bodies successively pass, said magnet being adjustable in position  
 10 radially and angularly with respect to the path of movement of the armature bodies, and circuit controlling means for causing the magnet to attract the armature bodies in succession.

10. A phonograph comprising in combination a rotatable support for the sound  
 15 record body, a plurality of armature bodies mounted to revolve with the support, an electro-magnet for attracting said armature bodies, circuit controlling means for causing  
 20 the magnet to attract the armature bodies in succession, and means for retarding the demagnetization of the magnet.

11. A phonograph comprising in combination a rotatable support for the sound  
 25 record body, a plurality of armature bodies mounted to revolve with the support, an electro-magnet for attracting said armature bodies in succession having a pair of polepieces between which the armature bodies  
 30 pass, and a shunt circuit around the magnet affording a path for the magnet discharge current and including means for effectively preventing flow of the magnet energizing current through said shunt circuit.  
 35

12. A phonograph comprising in combination a rotatable support for the sound record  
 40 body, a plurality of armature bodies mounted to revolve with the support, an electro-magnet for attracting said armature bodies, circuit controlling means for causing the magnet to attract the armature bodies in  
 45 succession, a governor controlling the magnet supply circuit, a shunt circuit around the magnet, and a flow controlling valve in said shunt circuit to effectively prevent flow  
 50 of the energizing current therethrough and to permit flow of the magnet discharge current.

13. A phonograph comprising in combination a rotatable support for the sound record  
 55 body, a plurality of armature bodies mounted to move with the support, an electro-magnet for attracting said armature bodies, circuit controlling means for causing the magnet to attract the armature bodies in  
 60 succession, a shunt circuit around the magnet, and an electrolytic valve connected in said shunt circuit.

14. The combination of a rotatable sound record body support of a phonograph, electro-magnetic motor means for driving said  
 support, a device controlled by the angular position of said support for energizing said

means intermittently as the support rotates, 65 means adapted when moved in one direction to effect a break in the motor circuit and simultaneously stop rotation of the support, said means being adapted when moved in  
 70 another direction to close said break in the motor circuit and simultaneously to impart a starting impulse to the support to insure the energizing of the motor circuit by said device.

15. The combination of a rotatable sound 75 record body support of a phonograph, electro-magnetic motor means for driving said support, a device controlled by the angular position of said support for energizing said means intermittently as the support rotates, 80 and means adapted when moved in one direction to effect a break in the motor circuit and when moved in the other direction to close said break and mechanically start the rotation of the support to insure the ener- 85 gizing of the motor circuit by said device.

16. A phonograph comprising in combination a rotatable support for a sound record  
 90 body, a plurality of armature bodies mounted to revolve with said support and spaced equal distances apart, an electro-magnet for attracting said armature bodies having a pair of polepieces mounted so that each armature body shall pass between said polepieces and be attracted by both said polepieces simultaneously, and circuit controlling means for causing the magnet to attract the armature bodies in succession, the inner faces of the magnet polepieces being formed to slant outwardly toward the side at which  
 100 the armature bodies enter between them.

17. A phonograph comprising in combination a rotatable support for the sound record  
 105 body, a plurality of armature bodies mounted to revolve with the support, electro-magnetic means for attracting said armature bodies comprising a pair of polepieces mounted radially of the axis about which the armature bodies revolve and so that each armature body shall pass between said polepieces and be attracted by both said polepieces simultaneously, said armature bodies being wider in the direction of their movement at their outer ends than at their inner ends.  
 110

18. A phonograph comprising in combination a movable support for the sound record  
 115 body, a plurality of armature bodies mounted to move with said support, electro-magnetic means for attracting said armature bodies, the arrangement of said armature bodies and said electro-magnetic means being such that each armature body when attracted by the electro-magnetic means is balanced magnetically in the magnetic field, and means controlling said electro-magnetic  
 120 means to cause it to attract said armature bodies in succession.  
 125

19. A phonograph comprising in combina-



tion a rotatable support for the sound record body, a plurality of armature bodies mounted to revolve with the support and spaced equal distances apart, electro-magnetic means for attracting said armature bodies comprising a pair of polepieces mounted on the same side of the axis of revolution of the armature bodies so that each body shall pass between said polepieces and  
10 be attracted by both said polepieces simul-

taneously, and circuit controlling means for causing said electro-magnetic means to attract the armature bodies in succession.

In testimony whereof I have hereunto set my hand in the presence of two subscribing  
15 witnesses.

GEORGE S. TIFFANY.

Witnesses:

A. L. KEETS,

PAUL H. FRANKE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE.

# 1,137,001-----P. Catucci,  
Patented-April 27, 1915.  
Filed- April 18, 1914.

1,137,001.

P. CATUCCI.  
TALKING MACHINE.  
APPLICATION FILED APR. 18, 1914.

Patented Apr. 27, 1915.  
9 SHEETS—SHEET 1.

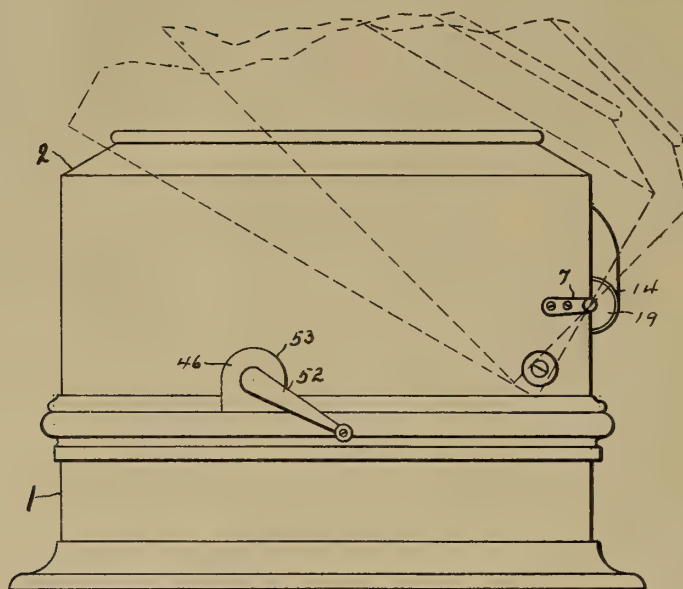


Fig. 1.

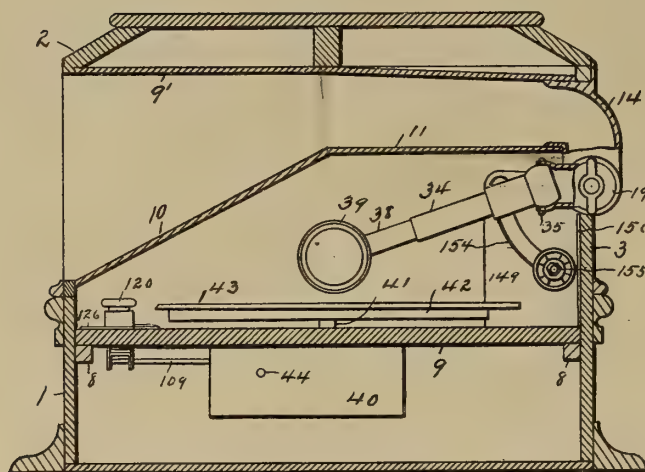


Fig. 2.

WITNESSES:

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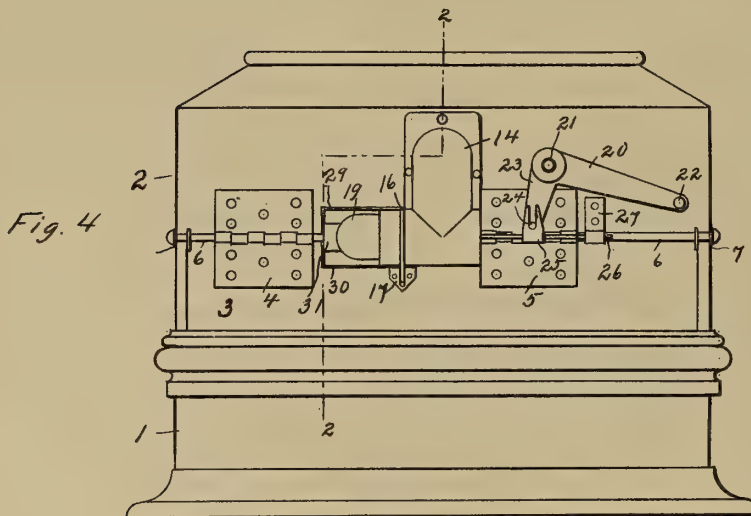
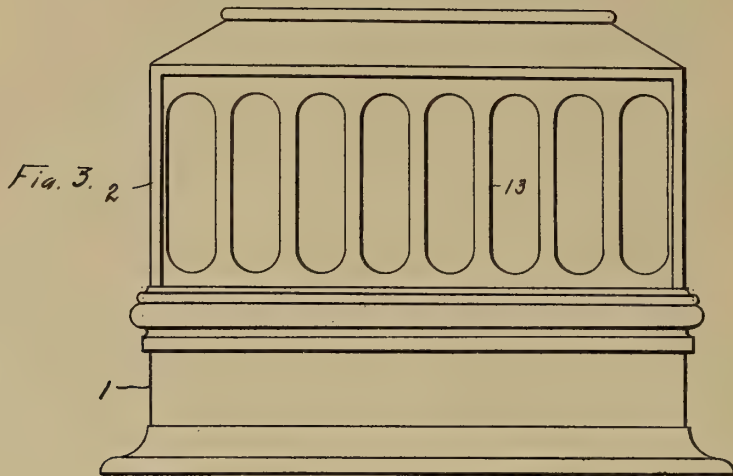




1,137,001.

P. CATUCCI.  
TALKING MACHINE.  
APPLICATION FILED APR. 18, 1914.

Patented Apr. 27, 1915.  
9 SHEETS—SHEET 2.



WITNESSES:  
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*H. B. Smith*

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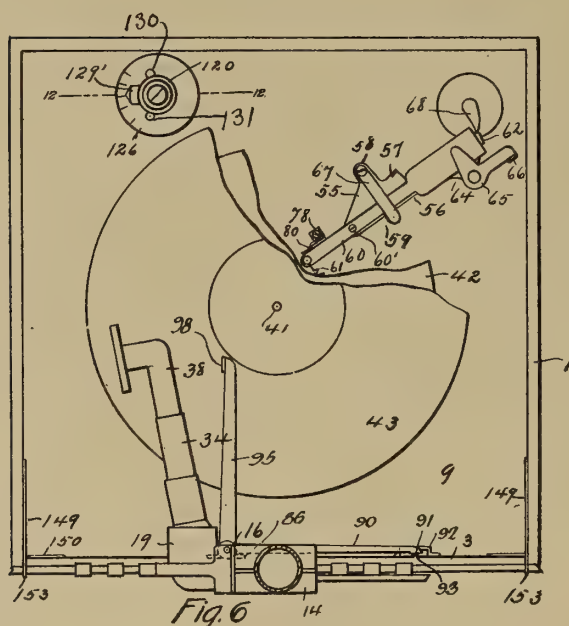
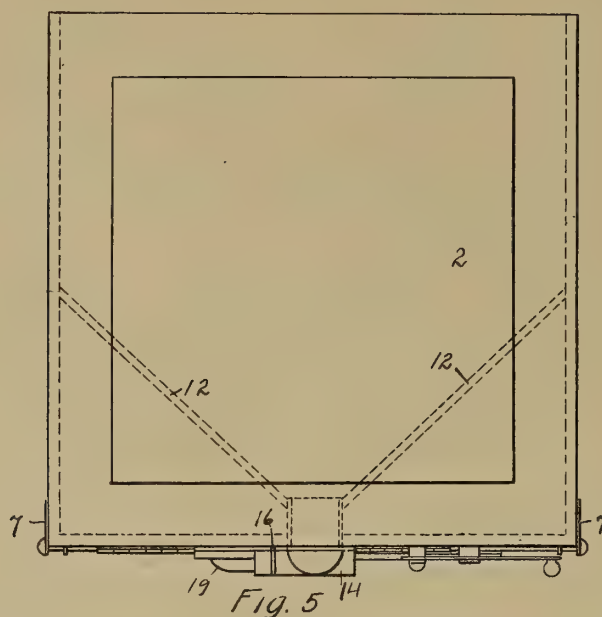




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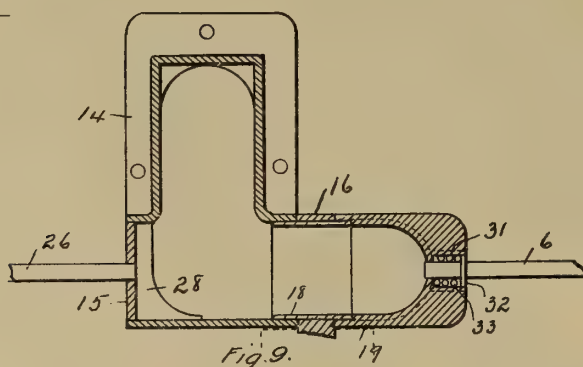
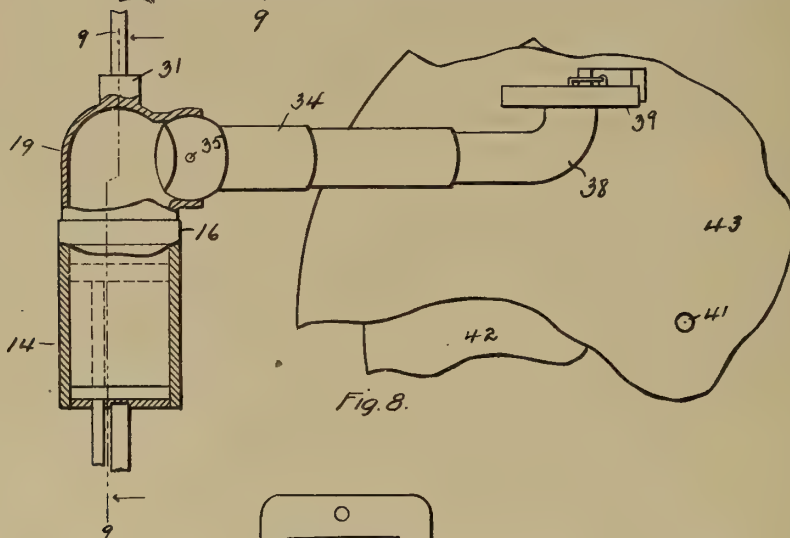
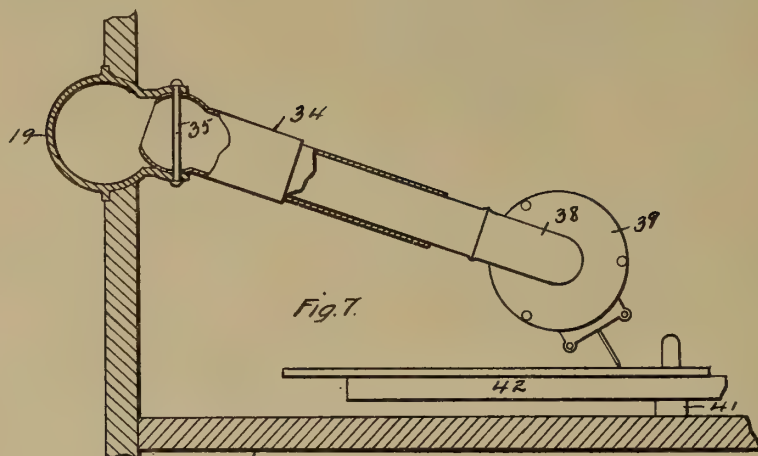
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9 SHEETS—SHEET 5.

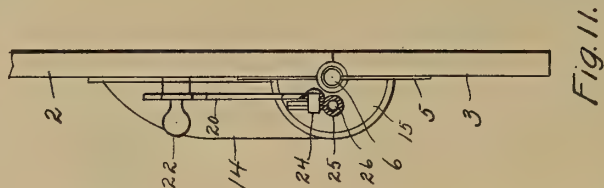


Fig. 11.

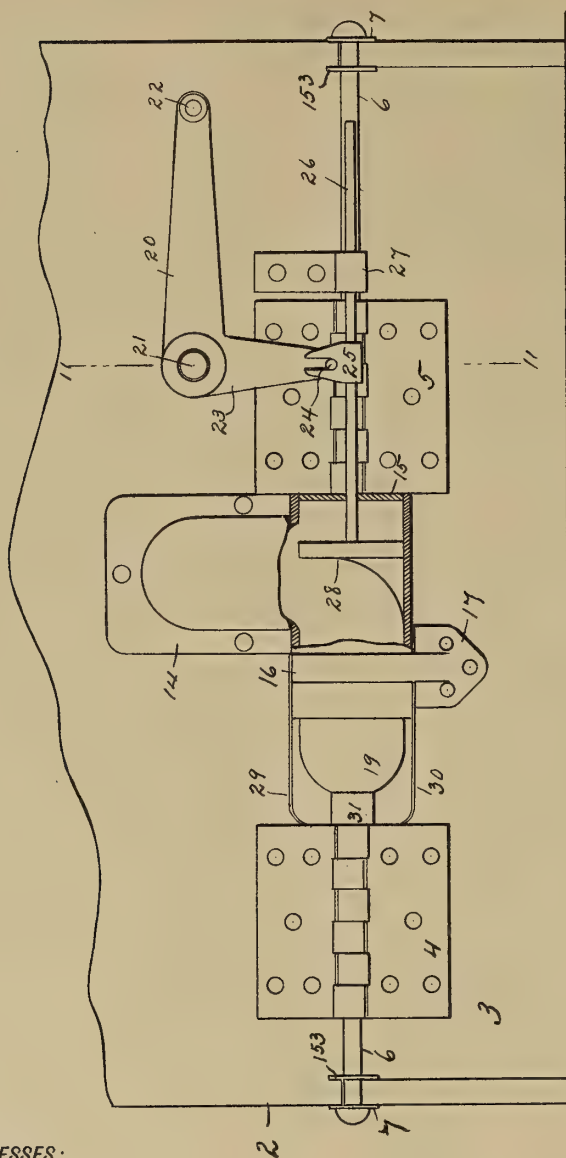


Fig. 10.

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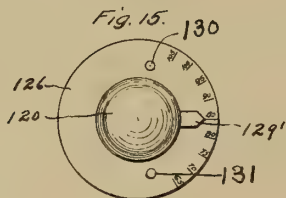
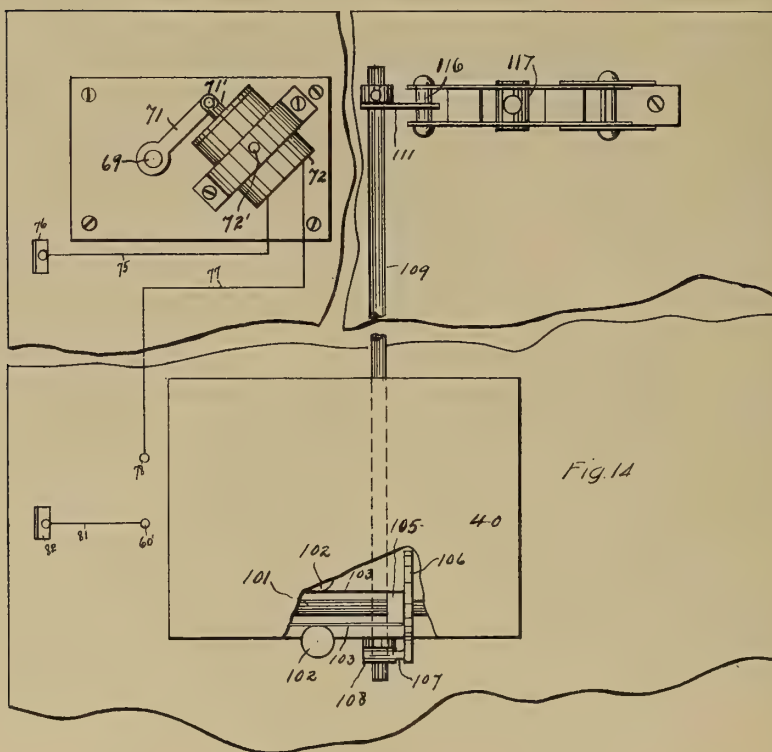
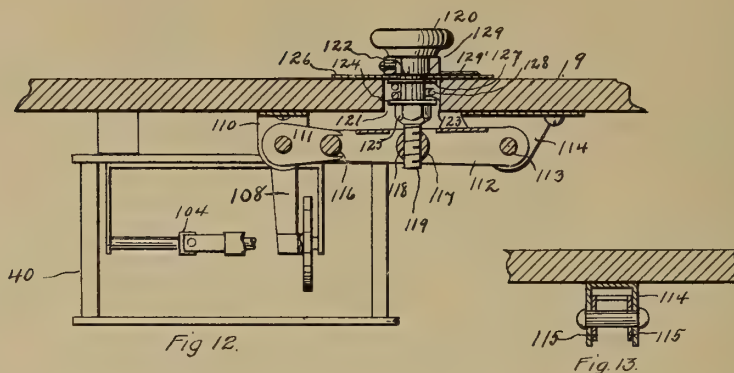




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Patented Apr. 27, 1915.  
9 SHEETS—SHEET 6.

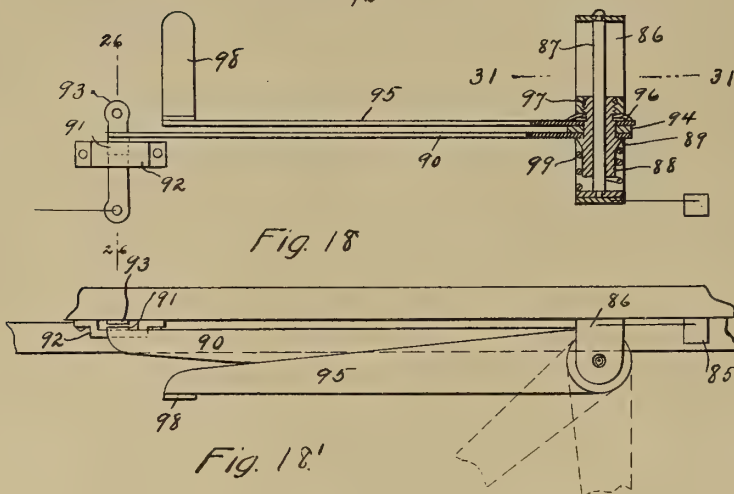
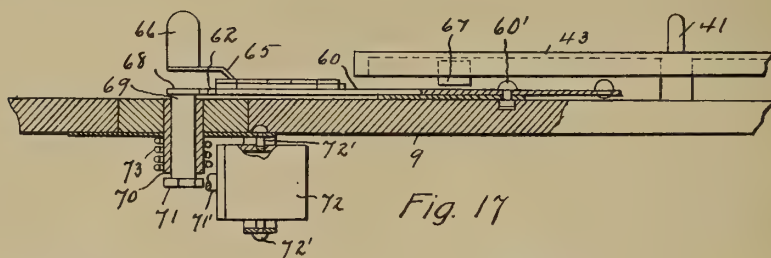
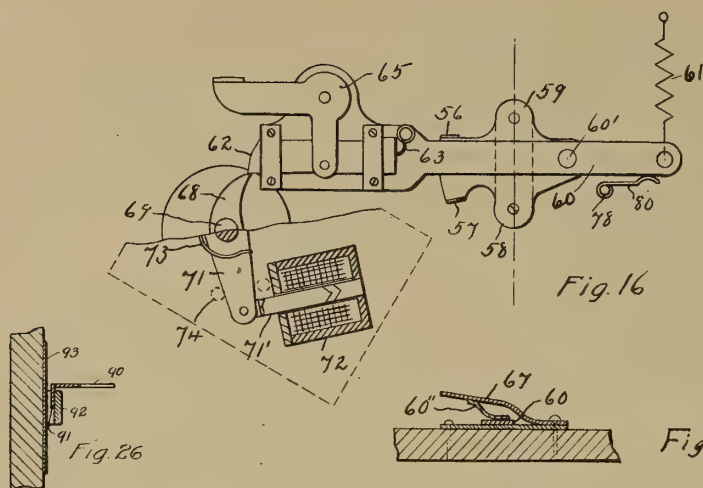




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9 SHEETS—SHEET 7.



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1,137,001.

Patented Apr. 27, 1915.  
9 SHEETS—SHEET 8.

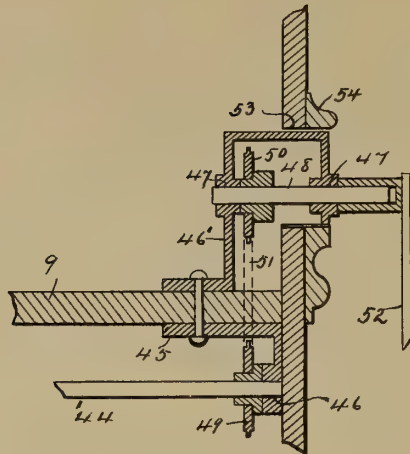


Fig. 19

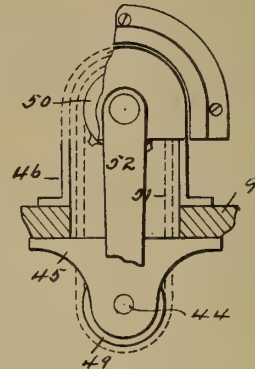


Fig. 20

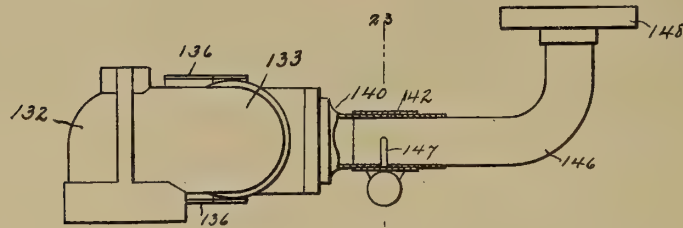


Fig. 21

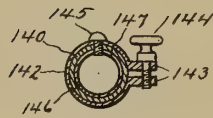


Fig. 23



Fig. 24

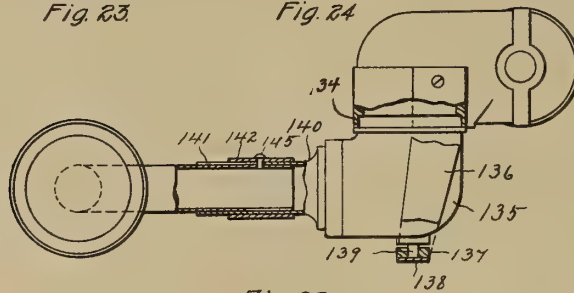


Fig. 22

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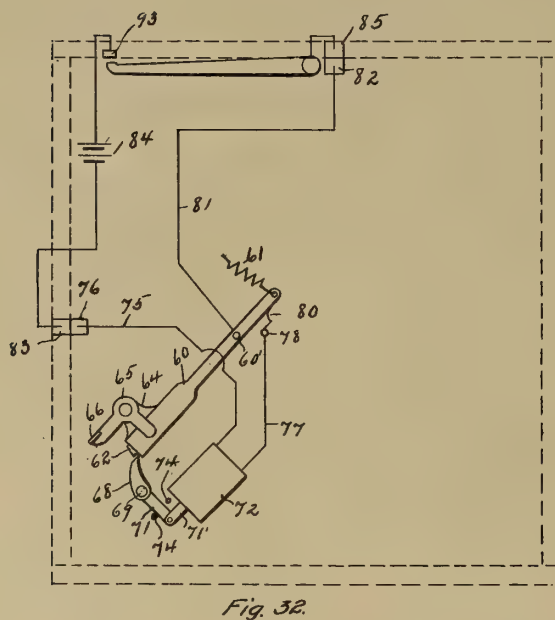
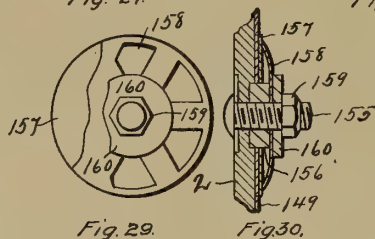
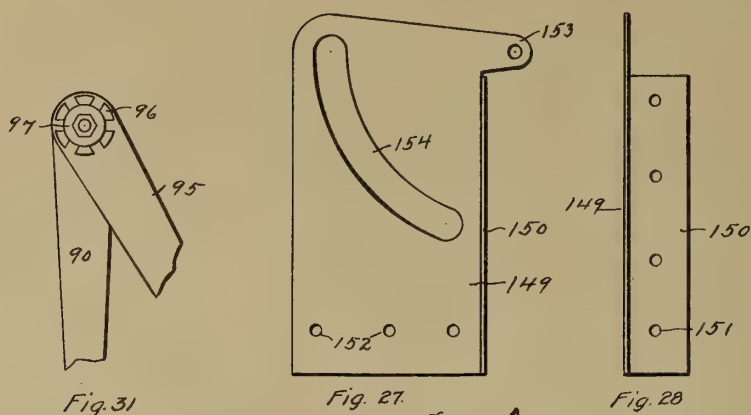




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APPLICATION FILED APR. 18, 1914.

Patented Apr. 27, 1915.  
9 SHEETS—SHEET 9.



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# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE.

1,137,001.

Specification of Letters Patent.

Patented Apr. 27, 1915.

Application filed April 18, 1914. Serial No. 832,710.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which form is a specification.

Hitherto it has been the practice to provide for the amplification of the sound waves by means of a horn supported above the disk record and capable of adjustment either in a horizontal plane or a vertical plane, or in some cases both in horizontal and vertical planes. Other forms of talking machine known as the hornless talking machine provide for the amplification of the sound waves by conducting the same beneath the disk record and through the case of the machine which in itself comprises a sound amplifier.

In this case the body of the machine is made considerably higher in order to afford sufficient space beneath or around the motor mechanism to form the proper exit for the sound waves. In the latter form of talking machine no means for adjusting the direction of the sound waves is provided other than the shifting of the entire machine around in various positions so that the exit for the sound waves may be directed to different points, but always away from the machine in a substantially horizontal plane, so that they have a tendency to follow a plane two or three feet from the floor. It can be readily shown, and has been repeatedly proven that the so called hornless talking machine gives a musical rendition much inferior in value and harmony to the so called horn style of machine. One of the reasons for this is the necessary reduction of the size of the amplifier due to lack of space, but still more is due to the location of the amplifier itself. In the hornless machine the outlet or exit for sound waves is ordinarily much lower than the ear of the auditor. In this type of talking machine it is customary to have a hinged lid or cover which may be raised for the purpose of applying or removing a disk record from the record support or turn table and thereafter the lid or cover is again lowered over the case of the machine; thus the lid or cover has been made use of to so inclose the motor as to deaden the necessary noise of its running so as not to let it interfere with the reproduction of the record itself. Other forms of talking

machines have been proposed, but for one reason or another they have not become commercially successful or sufficiently popular to warrant their continued manufacture.

My improved talking machine has for its principal objects the reduction in the height of the motor case and the corresponding increase in the height of the cover or lid so that the sound waves may be conducted up through the cover or lid which is so formed as to make a perfect sound amplifier which is adjustable in a vertical plane.

Another feature of my invention resides in the connection between the tone arm and the amplifier lid or cover, together with the means for softening or muffling the sound waves as they emerge from the tone arm.

A still further feature of my invention resides in the adjustable automatic stop mechanism whereby upon completion of the rendition of the record, the rotation of the turn table is automatically stopped.

Another and quite important feature of my invention resides in the means for varying the speed of the motor so as to render a record at the exact speed or tempo at which it was originally designed to be played. It is a well known fact that each manufacturer of phonograph or talking machine records designs his own records to be played at a certain predetermined speed, thereby making it impracticable to play such records upon any phonograph or talking machine except that upon which they are specifically designed to be played. These various speeds range from sixty revolutions of the turn table or record support to the minute up to as high as ninety revolutions to the minute. By the mechanism of my improved talking machine it is possible to so vary the speed of the machine as to adapt it for all of the various records now on the market.

In the accompanying drawings forming a part of this specification Figure 1, is a side elevation of the talking machine case showing in dotted lines the cover-amplifier in adjusted positions. Fig. 2, is a vertical section on line 2—2 of Fig. 4 showing location and vertical section of the amplifier and also showing in side elevation one form of tone arm. Fig. 3, is a front elevation of the talking machine showing the cover down and the lattice outlet of the amplifier. Fig. 4, is a rear elevation of the case showing the outside connection between the tone arm



and the cover amplifier, also illustrating the mechanism for operating the muffler. Fig. 5, is a top plan view showing in dotted lines the contour of the amplifier within the cover. Fig. 6, is a top plan view of the case with the cover removed with a part of the record and its table broken away to show the location of the stop mechanism. Fig. 7, is a side elevation partly in section of the tone arm and the connection leading to the amplifier. Fig. 8, is a top plan view partly in section of the tone arm. Fig. 9, is a vertical section of the tone arm connection drawn on line 9—9 of Fig. 8 looking in the direction of the arrow. Fig. 10, is a rear view of the hinge connection showing the muffler mechanism partly in section together with mechanism for operating same. Fig. 11, is a vertical section on line 11—11 of Fig. 10. Fig. 12, is a vertical section on line 12—12 of Fig. 6. Fig. 13, is a vertical section through the supporting bracket. Fig. 14, is a bottom plan view of the motor supporting plate or table showing the relative location of the mechanism secured to said plate, but broken away and condensed to show the operating parts within the range of the drawing. Fig. 15, is a plan view of the motor regulator. Fig. 16, is a top plan view partly in section of the stop mechanism. Fig. 17, is a side elevation partly in section of the same. Fig. 18, is a front elevation of the contact mechanism which operates the stop mechanism. Fig. 18', is a plan view of the same. Fig. 19, is a section through the counter shaft winding mechanism. Fig. 20, is a side elevation, partly in section of the same. Fig. 21, is a plan view of a modified form of tone arm. Fig. 22, is a side elevation of the same. Fig. 23, is a cross section on line 23—23 of Fig. 21. Fig. 24, is a detached view of the end of one of the sections of the tone arm. Fig. 25, is a sectional view of the stop mechanism. Fig. 26, is a section on line 26—26 of Fig. 18. Fig. 27, is a side elevation of the friction hinge for the cover. Fig. 28, is an edge view of the same. Fig. 29, is a side view partly in section of the friction washers used in connection with the friction hinge. Fig. 30, is a vertical section through the center of the friction washers. Fig. 31, is a plan view on line 31—31 of Fig. 18. Fig. 32, is a plan view of the circuit connection for operating the electric stop mechanism.

Similar reference numerals refer to like parts throughout the specification and drawings.

In Fig. 1, I have shown a side elevation of the talking machine case which comprises the rectangular box 1, and the amplifier-cover 2. The rear side of the box extends upwardly to a point substantially one half of the height of the cover 2 as shown at 3, and the hinge connection between the cover

2 and the extension 3 is along the upper edge of said extension 3 as clearly illustrated in Fig. 4. The two hinges 4 and 5 have their parts similarly arranged and secured respectively to the rear of the cover and to the upper edge of the extension 3 with the hinge pintles 6 located on the outside of the case, and the outer extremities of said pintles inserted into two apertured lugs 7 secured to the outer sides respectively of the cover as clearly shown in Figs. 1 and 5. Within the box 1, is provided a ledge 8, running completely around the inner surface of the box and serving as a support for the plate or table 9, which latter is detachable and is utilized for supporting the motor and other appurtenances of the machine. Within the cover is located the amplifier, the contour of which is shown in Figs. 2 and 5. It consists of a partition board 9', secured in the top of the cover as shown in Fig. 2, and extending from the front of the same to the rear, and also of the inclined board 10, extending from the lower edge of the front of the cover to a point about midway of the cover and from that point extending substantially horizontally as at 11. Diagonally arranged partition boards are shown in Fig. 5 at 12 which lead from points midway of the sides on the cover to the rear of the same so as to provide a substantially funnel shaped opening, leading from the tone arm hereinafter to be described. The forward end of the amplifier may either be left open for the outlet of the sound waves, or it may be provided with a grille or lattice work substantially as shown in Fig. 3 at 13. If desired the inner face of this lattice work grille may be covered with gauze or any suitable fabric to prevent the ingress of dirt or dust.

To the middle of the rear side of the cover is rigidly secured the elbow-T, 14, the rear side of the cover being cut away to permit the open end of the elbow-T to communicate with the small tapered end of the amplifier as shown in Figs. 2 and 5. The T part of the elbow-T is concentric with the pintles 6, one of which terminates on the one side within an aperture formed in the closure head 15 of the T. At the opposite end of the T 14, is a ring 16 abutting against the end of the T as shown in Figs. 4, 5 and 6, said ring being provided with a flat flange extension 17, the latter being secured to the rear of the box 3 as clearly shown in Fig. 4. Within this ring is a sleeve 18 rigidly secured to said ring and extending into the adjacent open end of the T as shown in Fig. 9, and extending in the opposite direction into the elbow connection 19 of the tone arm. This ring being thus secured is an additional hinge connection between the rear of the cover 2 and the upper extension 3, inasmuch as said ring is concentric with the hinge pintles 6.



Located a little above the hinge 5, is a bell crank 20 pivoted to the rear of the cover at 21. The free end of said bell crank is provided with handle 22, whereby it may be swung on pivot 21. The rectangular arm 23 of the bell crank extends downward and outside of the hinge 5, and is provided with a pin 24 at its lower end which takes into the open slot of a split sleeve 25, said sleeve being rigidly connected to a sliding rod 26, said rod being guided by the guide 27 rigidly secured to the rear of the cover as shown in Figs. 4 and 10. This rod 26, extends through the closed end 15 of the elbow-T 14 and at its inner end is connected to a piston muffler 28, the construction being such that by manipulating the bell crank 20, such piston muffler may be reciprocated within the T 14, so as to close all the connection between said elbow and tone arm connection 19.

The rear of the cover 2 is cut out at 29 as is also the extension 3 at 30 so as to permit of the oscillation of the elbow connection 19 upon ring 18. The end of the elbow connection 19 is provided with a spring socket 31 into which is inserted the adjacent end of the pintle 6 of the hinge 4, and upon the end of said pintle is rigidly secured a collar 32, which bears against a spring 33, the opposite end of said spring being located in said socket 31. This construction is such that the spring presses against the elbow connection 19 so that said connection bears with considerable friction against the ring 16, and thus the elbow and tone arm will remain in any position in which they may be placed because of such frictional engagement. The elbow connection 19 has its other or free end extending toward the center of the machine as indicated in Figs. 2 and 6, and is provided with a spherical opening as shown in Fig. 2. Within this spherical opening extends the inclined tone arm 34, the end of which is enlarged into spherical form to fit the spherical opening of connection 19. Extending substantially vertically through this spherical end of the tone arm, and the spherical socket opening is a pivot pin 35, the angle being such that the tone arm 34 when in playing position, will generate the surface of a cone, but through the frictional action of the opposite end of the elbow connection 19 with the ring 16, the tone arm may be elevated and lowered as desired for the purpose of placing the sound box upon the end of the tone arm into position to have its needle bear upon the surface of a disk record as will be fully hereinafter described. The normal position however of the tone arm 34 is as indicated in Figs. 2 and 7. The free end of the tone arm 34 is provided with an elbow tube 38 which extends into the tone arm 34 to some distance

and may oscillate within the same so that the sound box 39 may be turned over into the playing position indicated in Figs. 2 or 7, or turned through an angle of about 135 degrees to permit the renewal of the needle.

The frictional engagement of the elbow connection 19, with the ring 16, the latter being firmly secured to the rear extension 3, of the box 1, will permit the raising and lowering of the cover 2, without in any manner interfering with the tone arm 34, so that the cover 2, with its amplifier may be elevated or lowered to direct the sound waves as desired without affecting the pressure of the sound box needle upon the record.

As hitherto stated, the plate or table 9, is utilized to support the motor and other operative parts of the mechanism. In Fig. 2, the motor 40, is shown inclosed in a box and inasmuch as it may be any desired or preferred form of motor, I have not deemed it necessary to illustrate the same in detail except so far as may be essential to gain a knowledge of the methods of its manipulation. As shown the motor is firmly secured to the under side of the plate or table 9, in such position that the driving shaft 41, extends through and above the plate 9, to receive upon its upper end the detachable turn table 42, upon which is located the disk record 43, in position to permit the sound box to be lowered into playing position. The winding shaft 44, for winding up the spring of the motor extends laterally to the side of the box 1, as shown in Fig. 19. If said shaft were extended outside of the box, it would stand at a point so low down as not to permit the winding crank to have full sweep when the talking machine case is placed upon a table. In order, therefore, to permit the free swing of the winding crank, I provide the following structure, namely: On the under side of the plate 9, I locate the bracket 45, providing the same with a bearing 46 for the end of the shaft 44. Above the plate 9, is a second bearing bracket 46', hooded over as shown and provided with bearings 47 for a counter shaft 48 which extends beyond the side of the case. Upon the shaft 44 is located a sprocket wheel 49, rigidly secured thereto, and upon the counter shaft 48, is also located a sprocket wheel 50. Around these sprocket wheels is the sprocket chain 51. To the outer end of the counter shaft 48, is detachably secured the winding crank 52. It will thus be seen that by the use of the counter shaft 48, and its connection to the winding shaft 44, I am able to wind the motor with the winding crank 52, of a length sufficient for the purpose.

Inasmuch as the hood of the bracket 46', extends above the side of the box 1, it is necessary to cut out a notch 53, in the side of the cover 2, so that said cover may be



lowered down into the position shown in Fig. 2, without interfering with the bracket 46'. If desired, I may place an ornamental cap 54, over this opening so that the projecting end of the bracket 46', with the outside bearing 47, may be inclosed when the cover 2, is down.

As a means for stopping and starting the motor, I provide the following mechanism, reference being had to Figs. 6, 16, and 25. Referring to Fig. 6, 55 represents a plate secured to the upper side of the table 9. This plate 55, is provided with upturned lugs 56, and 57, together with lateral fastening arms 58, and 59. Pivoted to the end of the plate 55, is a lever 60, the short arm of which has connected to it a coil spring 61, the tendency of which is to throw the lever into a position bearing upon the upturned lug 57. The opposite end of the lever is provided with a spring bolt 62, normally projecting from the end of the lever, and held extended by means of a spring 63. The lever is provided with a lateral projection 64, upon which is pivoted an operating bell crank 65, which has the upturned finger piece 66. By pressing upon the outside of the finger piece 66, the bolt 62, may be pressed inwardly against the spring 63, and upon release, said spring will restore the bolt into the position shown in Fig. 16. Rigidly secured to the lug 58 of the plate 55, is a cambered spring 67, which is located over the lever 60. Upon the lever 60 is secured an upturned cam 60'', in position to bear upon the under side of the spring 67, so that as the lever 60 is swung from side to side, the free end of the spring 67 will be raised and lowered. The spring 67 is in position to bear upon the under side of the turn table 42 when the lever 60 is turned into a position to bear upon the lug 57; but because of the camber and elasticity in the spring 67, when the lever 60 is turned into position shown in Fig. 25, the spring 67 will drop away from the under side of the turn table 42, and thus permit the motor 40, to drive the turn table 42. If desired, I may provide the upper face of the camber spring 67, with a layer of leather or paper or any friction material by which the frictional engagement of said spring with the under side of the turn table 42, may be made more effective.

As a means for holding the lever 60, in the position shown in Fig. 16, I provide a pawl 68, pivoted upon vertical shaft 69, the point of said pawl being in a position to engage the point of the bolt 62, as clearly shown in Figs. 6, and 16. When the pawl 68, is released from the point of the bolt 62, it will be readily seen that the spring 61, will swing the lever 60, over against the stop lug 57, carrying with it the cam upon such lever into engagement with the cambered

spring 67, whereby as above explained, the rotation of the turn table 42, is stopped. As a means for automatically disengaging the pawl 68, from the bolt 62, I provide the following mechanism. The shaft 69, extends through a bearing 70, firmly secured in the plate or table 9, and is provided upon its lower end with a lever 71, to the end of which is pivotally secured an armature 71', of the ironclad magnet 72. Surrounding the bearing 70, and having one end secured thereto is a spring 73, the opposite end of which spring is carried around and bent over the lever 70, so that it has a tendency to hold the pawl 68, in position to engage the point of the bolt 62, as shown in Fig. 16. This action also withdraws the armature 71, from the ironclad magnet 72. The ironclad magnet 72, is pivoted in vertical trunnions 72', so that it may have a slight oscillation as this armature 71, reciprocates within its core. In this manner the binding of the armature and magnet is prevented. From this mechanism it can be readily seen that the normal tendency of the spring 73, is to hold the shaft 69, with the arm 70, against the stop pin 74, while the pawl 68, is held in the position illustrated in Figs. 6, and 16. When the lever 60, is swung around into the position shown in these two figures, the point of the bolt 62, will depress the pawl 68, against the action of the spring 73, so as to snap over it and be held in position to release the cambered spring 67, from the under side of the turn table 42, thereby permitting free rotation of said turn table. When, therefore, the magnet 72, is energized, the armature 71 will be suddenly drawn into its core, thereby releasing the pawl 68, from the point of the bolt 62, whereupon the spring 61, will pull the lever 60, around against the upturned lug 57. The cam upon the lever 60, will then bear upon the under side of the cambered spring 67, raising its free end into contact with the under side of the turn table 42, and thereby stopping rotation of said turn table. I will now proceed to describe the mechanism for energizing the magnet 72, whereby the action just described is brought about. Referring now to Fig. 14, the circuit which includes the magnet 72, is partially shown. Leading in wire 75, is carried from a contact spring 76, secured upon the under side of the plate or table 9, to the magnet 72. The other terminal wire 77, leading to the magnet is carried to the binding screw 78, which passes through the plate or table 9, and has secured at its upper end, the contact spring 80, in position to engage the side of the lever 60, when said lever is in the position indicated in Fig. 16. The lower end of the pivot 60', of the lever 60, is connected by means of the wire 81, to a contact spring 82, located upon the under side of the plate or



table 9, adjacent to the edge of the same. The two contact springs 76, and 82, are so located upon the under side of the plate or table 9, that they respectively bear upon the two contact plates 83, and 85, secured to the ledge 8. The circuit wire leads from the contact plate 83, to one terminal of an electric battery 84, which may be conveniently located in the box 1. The other battery wire leads from the battery 84, to contact plate 93, secured upon the rear side of the box 2. The wire leading from the contact plate 85, is carried within the box 2, to the pivot plate 86, also secured to the rear side of the box 2, so that when the contact herein-after referred to is closed the circuit will be completed through the magnet 72, thereby energizing the same and actuating the pawl 68, to release the lever 60. The contacts just referred to are as follows: The pivot plate 86, hitherto referred to carries a pivot pin 87, upon which is rigidly secured a sleeve 88, shouldered at 89. Bearing upon the shoulder 89, is a contact arm 90, extending parallel to the rear side of the box 1, with its outer extremity in close proximity to the contact point 93. This arm 90, is rigidly secured to the sleeve 88, and said arm and sleeve together with the pivot pin have a very minute oscillation in the pivot plate 86. The oscillation however, is limited by reason of the fact that the outer end of the arm 90, has a downwardly extended projection 91, which is inserted behind loop 92, the latter being rigidly secured to the rear of the box 1. The coil spring 99, has a tendency to hold the projection 91, against the loop 92, and away from the contact 93. Just above the contact arm 90, and surrounding the sleeve 88, is the spacing washer 94, above which is located the friction arm 95, which is rotatively mounted upon the sleeve 88, and is held against the washer 94, by means of the star spring washer 96, the pressure of the latter being adjusted by means of the nut 97, which is screw threaded to the upper end of the sleeve 88. In this manner the friction arm 95, may be adjusted around the sleeve 88, to any desired point. The lightness of the spring 99 is such that the slightest touch upon the arm 95, will cause the projection 91, to contact with the contact plate 93. The outer free end of the friction arm 95, has the upturned projection 98, which lies in the path of the tone arm 34.

In practice when it is desired to automatically stop the motor, the tone arm 34, is swung around over the record to a point where the needle may rest in the innermost groove of the record. The friction arm 95, is then swung around into contact with the rear side of the tone arm or its extension elbow 38, in which position the arm 95, is allowed to rest. The tone arm then is swung around back to the initial point of

the record groove and the lever 60, is swung into the position shown in Figs. 6, and 16, whereupon the motor will start. Upon the completion of the record, the tone arm will have been carried by the record groove to its innermost convolution, at which point the elbow 38, will press against the upward projection 98, and as hitherto described, the lightness of the spring 99, will not resist a further pressure which will carry the arm 90 into contact with the contact piece 93, thus establishing an electric circuit through the magnet 72, which operation will automatically release the pawl 68, and cause the automatic stoppage of the motor. In Fig. 32, I have shown a diagram of the circuit closing mechanism so arranged that the removal of the plate or table 9, will not disturb the circuit wires in the least. The battery 84, as hitherto described may be located in the box 1, with one of its poles connected to the contact plate 93, and the other pole connected to the contact plate 83. The contact plate 83, is so located upon the ledge 8, as to register with the contact spring 76, which latter is secured to the plate or table 9, with the connection wire 75, leading therefrom to the magnet 72. The wire 77, as shown in Fig. 32, leads to the binding post spring 78, which latter carries the spring 80, located in position to bear upon the side of the lever 60, when the latter is in the position shown. The circuit wire 81, connects the pivot 60', with the contact spring 82, secured to the edge of the plate or table 9, in position to bear upon a contact plate 85, which latter is directly connected to the pivot plate. Thus metallic connection of the circuit is complete when the arm 90, closes with the contact 93. In Figs. 12, 13, and 14, I show in detail the mechanism for regulating the speed or tempo at which the record is played. In Fig. 14, I show so much of the motor as is necessary to gain an understanding of the methods of regulating it. The governor 101, is of the usual type, having the two balls 102 secured to flat springs 103, the right end of which as shown in Fig. 14, are rigidly secured to the collar 104. The opposite ends of the springs 103, are secured to the sliding collar 105, and to the latter is secured the disk 106. This is the usual governor for regulating the speed of the motor when taken in connection with a brake. The brake which I have shown consists of a piece of felt or other friction material 107, secured in the free end of an arm 108, which in turn is adjustably secured upon the end of a rock shaft 109. Suitable bearings for the rock shaft are mounted upon the upper side of the upper motor plate, but are not shown in the drawings. The shaft 109, extends to the forward side of the plate or table 9, where it is supported



in the bearing 110. It is provided with a rock arm 111, rigidly secured thereto and lying parallel to the under face of the plate 9. It is understood that the rock shaft 109, together with the rock arms 108, and 111, are substantially rigid and when said rock arm is oscillated to a point where the friction brake 107, bears against the disk 106, the friction will be sufficient to check the motor. However, as the rock arm 108, is oscillated away from the disk 106, the motor will speed up and the centrifugal force will cause the governor balls 102, to fly outward, thus bringing the sliding collar 105, with the disk 106, against the friction piece 107, thereby limiting the speed of the motor, as is well known. The means for oscillating the shaft 109, consists of the lever 112, pivoted at 113, in the bracket 114, upon the under side of the plate or table 9. The lever 112, consists of a plate blanked out, and having its edges bent at right angles to the plane of the plate as shown in Fig. 13, so as to form the downwardly extended flanges 115. The forward end of the lever is provided with a cross pin 116, which receives the adjacent end of the rock arm 111. Midway between the pivot pin 113, and the cross pin 116, is located a cross head 117, journaled in the side flanges 115, of the lever. This cross head has a central screw threaded aperture 118 which receives the threaded end 119 of the regulating thumb screw 120, which latter extends through an aperture 121 in the plate or table 9. This thumb screw is provided with the two shoulders 122 and 123, and against the latter shoulder rests the washer 124, held in place by means of the nut 125, which latter is screwed upon the stem 119. The larger diameter of the thumb screw 120 bears upon the index plate 126. Bearing against the under side of the plate 126 is the washer 127, and between said washer and the washer 124 is the compression spring 128.

Between the head of the thumb screw 120 and the plate 124 is located a friction ring 129, having the laterally projecting pointer 129' to register with the various divisions upon the index plate 126. The spring 128 bearing as it does upon the washer 127, will produce considerable friction between the index plate 126 and the ring 129, so that the turning of the thumb screw 120, to bring the pointer 129' to register with the various divisions on the index plate 126, will be resisted by such friction and thus there will be no danger of the accidental displacement of the regulating mechanism. The turning of the thumb screw 120 in one direction or the other, will raise or lower the lever 112, and the raising or lowering of this lever produces a rocking of the shaft 109, and a consequent movement of the friction felt 107, toward and away from the disk 106.

The degree of this oscillation is very minute to cover the various speeds between sixty and ninety revolutions per minute of the turntable 42, and for this reason it is essential that the multiplying lever 112 be introduced into the structure, or at least some mechanism which will permit of a considerable range for the index finger, around the divisions of the index plate 126. By this mechanism I am enabled to obtain all of the various speeds for the turntable, which are requisite to the proper rendition of the various records now on the market. If greater or less speed of the turntable is desired or necessary, more divisions upon the index plate 126 may be provided, and the stop pins 130 and 131, may be located at a greater distance apart.

In Figs. 21 to 24, I have shown a slight modification of the tone arm over that shown in Figs. 7 and 8. In this modification, the elbow-T 14, and the friction ring 15 remain the same. The tone arm elbow 132 however, is somewhat modified, inasmuch as I dispense with the spherical socket in the same and substitute an elbow 133, to the lower end of which I provide a bearing 134, to receive a second elbow connection 135, which latter is pivoted to swing in the bearing 134. In order to form a convenient means for connecting the two parts 132 and 135, I provide the saddle 136, the upper ends of which are secured to the sides of the elbow 133, with a pivotal bearing 137 located upon the horizontal part 138 of said saddle. In said pivotal bearing rests the pivot 139, which extends downwardly from the elbow 135. Rigidly secured in the elbow 135 at its free open end is the tone arm 140, the outer end of which is longitudinally slotted as at 141. Surrounding this tone arm 140 is the sliding split sleeve 142, provided with the laterally projecting lugs 143 in which is located the thumb screw 144, the purpose of which is to clamp the split sleeve rigidly in adjusted positions along the tone arm 140. Projecting through a screw threaded aperture in the top side of the split sleeve 142, is a small screw 145, of sufficient length to extend into and through the slot 141, and beyond the interior of the tone arm some little distance. Extending into the tone arm 140, as shown in Figs. 21 and 22, is the elbow extension 146, which is circumferentially slotted as at 147 to receive the inner end of the screw 145. The slot 147 extends around the circumference of the elbow 146 through an angle of about 135 degrees. It will thus be seen that the elbow connection 146 may be oscillated within the tone arm 140 to a sufficient distance to permit the swinging of the sound box 148 into position to permit the insertion and removal of the sound box needle. The construction also permits of the longitudinal extension of the tone arm through the loosening 130



ing of the thumb screw 144, and the sliding of the sleeve 142 along the same substantially the length of the slot 141, and wherever adjusted, the thumb screw 144 will be screwed home to hold the elbow extension 146 in place, against longitudinal shifting. This however does not prevent the oscillation of the elbow extension 146 within the tone arm.

In Figs. 27 to 30, I show the details of the friction mechanism whereby the cover 2 may be held in adjusted positions in a vertical plane, so that the sound waves may be directed at various angles from the amplifier. This friction mechanism consists primarily of the angle plate 149, of the general contour shown in Fig. 27. The vertical flange 150 projects at right angles from the plane of said plate, and is provided with a series of screw holes 151, by which said plate is rigidly secured to the upward extension of the box 1. A second series of screw holes 152 is utilized for securing the broad flat surface of the plate to the upper edge of the inside of the box 1 above the ledge 8. At the upper right hand corner of the plate is the apertured lug 153, through which the pintle 6 passes. In the broad surface of the plate is a circular slot 154, which is concentric with the aperture in the lug 153. Referring to Figs. 1 and 2, it will be noted that at the lower right hand corner of the cover is a bolt 155. This bolt passes through the side of the cover and extends through the slot 154 of the plate 149. The slot 154 is somewhat wider than the diameter of the bolt 155, to receive the filling washer 156. Bearing against the outside of the plate 149 is a friction washer 157, against which is the spring star wheel 158, the arms of which are cambered so as to bear with considerable friction against the washer 157, when the nut 159 is screwed upon the inner end of the bolt 155. I may insert a washer 160 underneath the nut 159 in order to increase the bearing area of the nut 159. It is to be understood that the friction plate 149 is duplicated on the other side of the cover and box, but since they are of the same general contour, the one being a right and the other a left, the illustration of one is deemed sufficient.

I claim,

1. In a talking machine, the combination of a motor box, with a hinged cover, a tone arm, an amplifier within said cover, a connection between said tone arm and said amplifier concentric with the hinge of said cover, and frictional means for holding said cover and amplifier in adjusted positions.

2. In a talking machine, the combination of a motor box, with a combined amplifier and cover for said box, a friction hinge connection between said box and cover whereby said cover may be adjusted to any degree

of angularity in a vertical plane, a tone arm, a connection between said tone arm and said amplifier, and a friction hinge connection between said tone arm and said box whereby said tone arm may be adjusted in a vertical plane independently of the amplifier and without breaking the connection between said tone arm and said amplifier.

3. In a talking machine, the combination of a motor box, with a sound amplifier pivotally mounted upon said box to swing in a vertical plane, a tone arm frictionally connected to said box and amplifier to swing in a vertical plane, and a series of friction plates, connected to said box and amplifier for holding said amplifier in adjusted position relatively to said box.

4. In a talking machine, the combination of a motor box, with a sound amplifier pivotally mounted thereon to swing in a vertical plane, a slotted friction plate rigidly mounted upon said box, a second friction plate carried by said amplifier, and means for resiliently pressing said plates together whereby said amplifier will remain in any adjusted position.

5. In a talking machine, the combination of a motor box and turn-table, a motor within said box for driving said turn-table, a cover hinged to said box, having an amplifier fixed therein, adjustable friction mechanism connecting said cover and said motor box, for holding said cover in any desired angular position relatively to said box, and a tone arm frictionally connected to said amplifier for adjustment in a vertical plane, and carrying a sound box adapted to play a record mounted upon said turn-table.

6. In a talking machine, the combination of sound reproducing means, a box or case for inclosing said sound reproducing means, and comprising a cover hinged to said box, friction plates connected to said cover and to said box for holding said cover in adjusted position relatively to said box, a sound amplifier rigidly secured within said cover, and a tone arm communicating with said sound amplifier and frictionally connected to said box for adjustment in a vertical plane.

7. In a talking machine, the combination of a motor box, having its rear side extending above the upper edge of said box, a cover for said box pivotally mounted upon the upper edge of said extension, a sound amplifier rigidly mounted within said cover, means for holding said cover in adjusted position in a vertical plane and a vertically adjustable tone arm pivotally mounted upon the upper edge of said extension and having an elbow connection with said amplifier coaxial with said pivotal connection between the cover and extension.

8. In a talking machine, the combination of a sound amplifier pivoted to swing in a

vertical plane only, a tone arm, a connection between said tone arm and said amplifier comprising a pair of mating elbows, a rigidly fixed friction ring located between  
5 said elbows whereby said tone arm may be held in vertically adjusted positions, and a vertical pivotal connection between one of said elbows and said tone arm whereby said tone arm may swing in a horizontal plane.

10 9. In a talking machine, the combination of a horizontally swinging vertically adjustable tone arm, a sound amplifier pivotally mounted to swing in a vertical plane, and a connection between said tone arm and said  
15 sound amplifier comprising a pair of connecting elbows and a ring fixed against rotation, and frictionally engaging the respective adjacent ends of said elbows.

10. In a talking machine, the combination  
20 of a motor box, and a cover pivotally connected thereto, a sound amplifier rigidly secured within said cover, a horizontally swinging vertically adjustable tone arm, and a connection between said tone arm and said  
25 amplifier comprising a pair of mating elbows, and a friction ring rigidly connected to said box and having frictional engagement with the mating ends of said elbows.

11. In a talking machine, the combination  
30 of a motor box, and a cover pivotally connected therewith, a sound amplifier rigidly secured within said cover, means whereby said cover and amplifier may be adjusted to various positions in a vertical plane, and a  
35 tone arm having an elbow connection with said amplifier, one arm of said elbow connection being located concentrically with the pivotal connection between said cover and box.

40 12. In a talking machine, the combination of a motor box having an upward extension upon its rear side, a cover pivotally connected to the upward edge of said extension, a sound amplifier rigidly secured within  
45 said cover, means whereby said cover and amplifier may be adjusted to various playing positions in a vertical plane, and a tone arm having an elbow connection with said amplifier one arm of said elbow connection  
50 being located concentrically with the pivotal connection between said cover and the upper extension of said box.

13. In a talking machine, the combination of a motor box or case, a cover hinged to  
55 said box or case, a sound amplifier rigidly mounted in said cover, a swinging tone arm pivotally supported by said motor box, a tubular elbow having a horizontal arm between said amplifier and said tone arm, and  
60 a sliding piston in said tubular elbow with manually operated means mounted upon said cover for reciprocating said piston within said tubular elbow.

14. In a talking machine, the combination  
65 with a horizontally swinging, vertically ad-

justable tone arm and a vertically adjustable sound amplifier, a tubular elbow connection having a horizontal arm between the sound amplifier and said tone arm, a reciprocating  
70 piston in said elbow connection, and manually operated means for reciprocating said piston within said tubular elbow connection.

15. In a talking machine, the combination of a horizontally swinging vertically adjustable tone arm, a sound amplifier pivotally mounted to swing in a vertical plane,  
75 means for holding said sound amplifier in any adjusted position, comprising a fixed slotted plate, an apertured friction disk located on one side of said plate, and a  
80 screw-threaded bolt passing through said disk and the aperture in said plate and connected to said amplifier whereby said disk may be pressed into variable frictional engagement with the side of said fixed plate,  
85 and a connection between said tone arm and said amplifier comprising a pair of mating elbows, and a ring fixed against rotation and frictionally engaging the respective adjacent ends of said elbows.

16. In a talking machine, the combination of a motor box and a cover pivotally connected thereto, a sound amplifier rigidly secured within said cover, a horizontally swinging vertically adjustable tone arm, a  
95 tubular connection between said tone arm and said amplifier and means for holding said cover and amplifier in adjusted positions in a vertical plane comprising a plate rigidly secured to said motor box and having  
100 an arcuate slot concentric with the pivotal connection of said cover, and an apertured friction disk located on the inner face of said slotted plate with a bolt passing through the aperture in said disk and through said slot and connected to said  
105 cover whereby said disk engages said plate with greater or less friction.

17. In a talking machine, the combination of a motor box, a cover pivotally connected therewith, a funnel-shaped sound amplifier rigidly secured within said cover, and a tone arm having an elbow connection with said amplifier, one arm of said elbow connection  
115 being located concentrically with the pivotal connection between said cover and said box.

18. In a talking machine, the combination of a motor box or case with a hinged cover therefor, a sound amplifier rigidly mounted in said cover, a horizontally swinging vertically adjustable tone arm pivotally supported by said motor box, and a horizontal tubular elbow connection between said amplifier and said tone arm coaxial with the hinge connection between said motor box  
125 and said sound amplifier.

19. In a talking machine, the combination of a motor box, a cover pivotally connected therewith, means for holding said cover in any vertically adjusted position, a funnel-  
130



shaped sound amplifier rigidly secured within said cover, and a tone arm having an elbow connection with said amplifier, one arm of said connection being located concentrically with the pivotal connection between said cover and said box.

20. In a talking machine, the combination of a motor box or case with an adjustable cover hinged thereto, a sound amplifier rigidly mounted in said cover, means for holding said cover and amplifier in vertically adjusted positions, a horizontally swinging, vertically adjustable tone arm pivotally supported by said motor box, and a horizontal, tubular elbow connection between said amplifier and said tone arm co-axial with the hinge connection between said motor box and said cover.

21. In a talking machine, the combination of a motor box and a hinged cover therefor, a sound amplifier rigidly mounted in said cover, a horizontally swinging, vertically adjustable tone arm pivotally supported in

said motor box, a horizontal, tubular elbow connection between said amplifier and said tone arm co-axial with the hinge connection between said motor box and said cover, and a reciprocating piston within said tubular elbow connection.

22. In a talking machine, the combination of a motor box and a hinged cover therefor, a sound amplifier rigidly mounted in said cover, a horizontally swinging, vertically adjustable tone arm pivotally supported in said motor box, a horizontal, tubular elbow connection between said amplifier and said tone arm co-axial with the hinge connection between said motor box and said cover, a reciprocating piston within said tubular elbow connection, and manually operated means for reciprocating said piston within said tubular connection.

PLINY CATUCCI.

In presence of—

L. M. SANDERS,

W. A. MEYER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



RESONATOR,

#1,137,187-----J. H. Comer-

Patented-April 27, 1915.

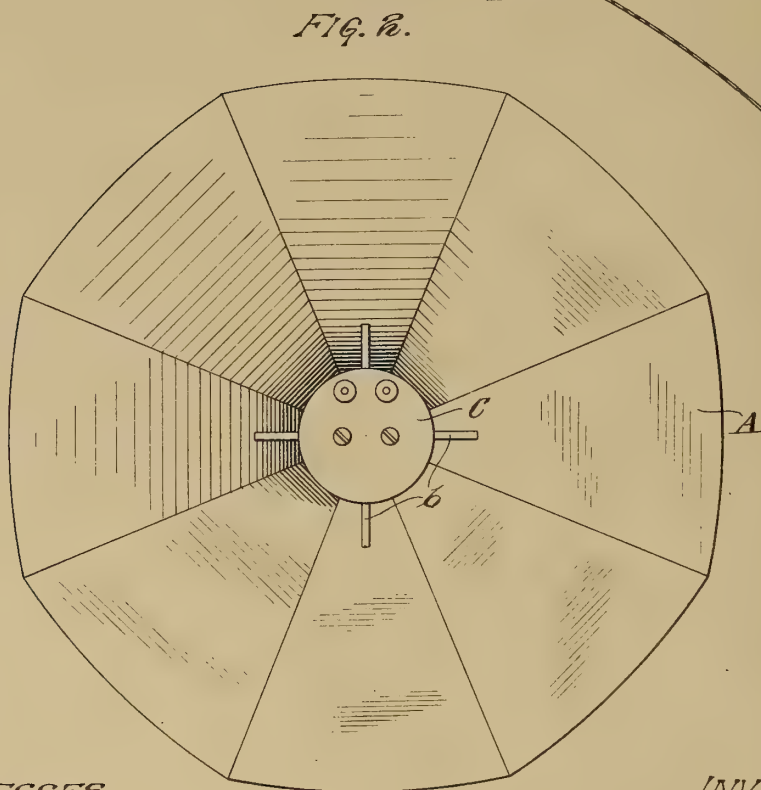
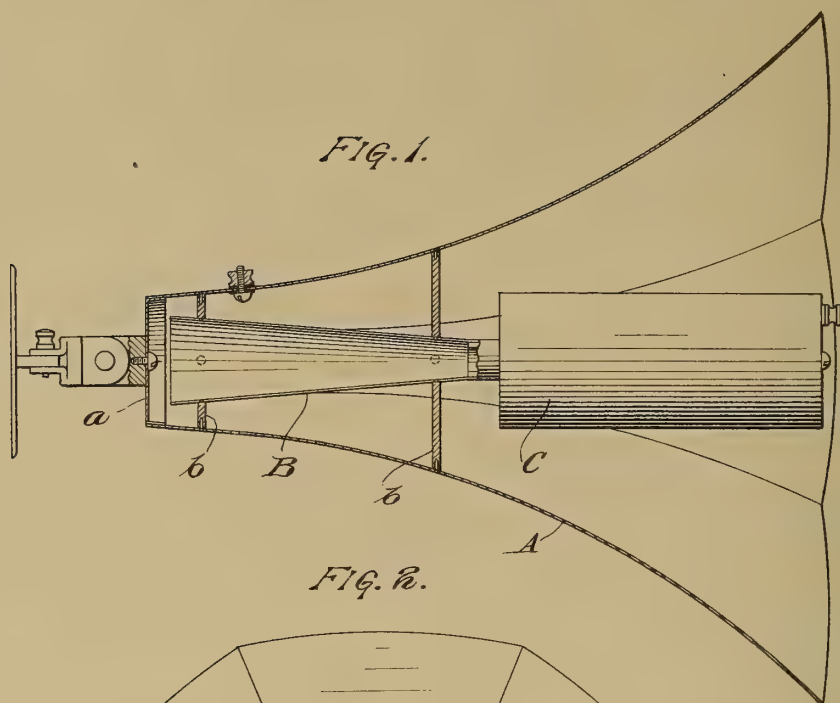
Filed-January 23, 1911.



1,137,187.

J. J. COMER.  
RESONATOR.  
APPLICATION FILED JAN. 23, 1911.

Patented Apr. 27, 1915.  
4 SHEETS—SHEET 1.



WITNESSES  
A. Andersen.  
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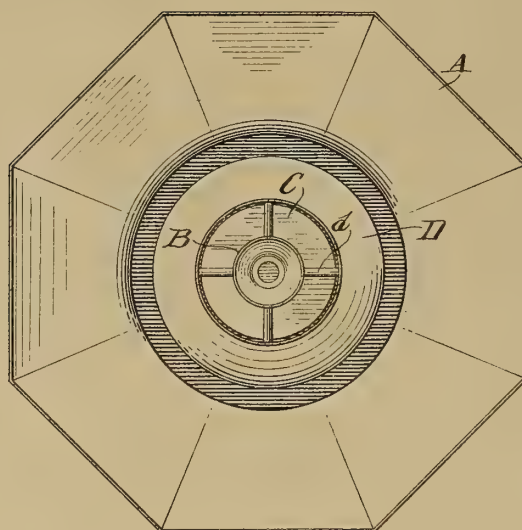
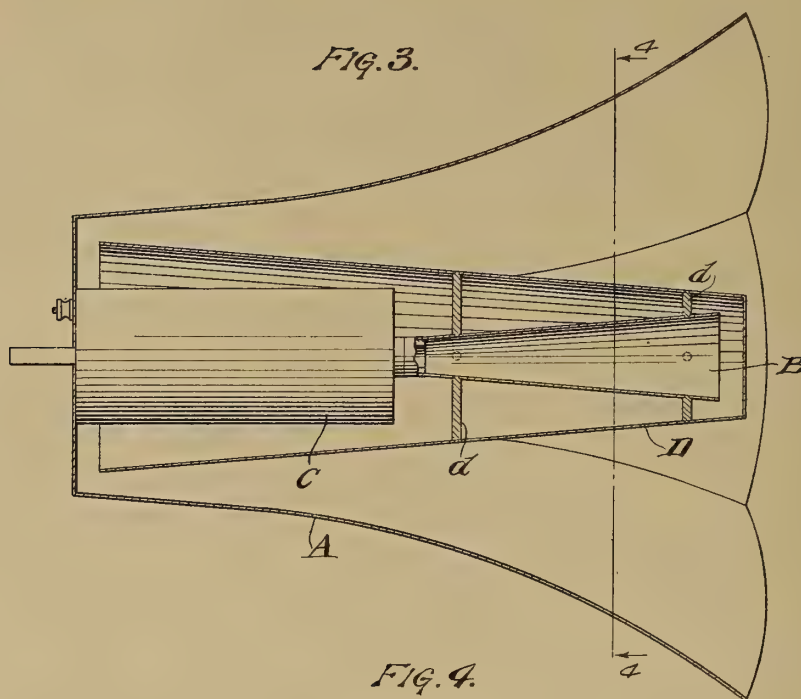
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1,137,187.

J. J. COMER.  
RESONATOR.  
APPLICATION FILED JAN. 23, 1911.

Patented Apr. 27, 1915.  
4 SHEETS—SHEET 2.



WITNESSES

A. Andersen.  
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1,137,187.

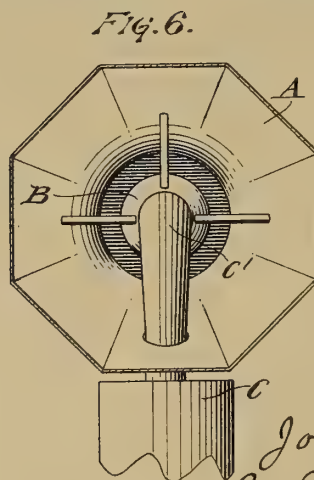
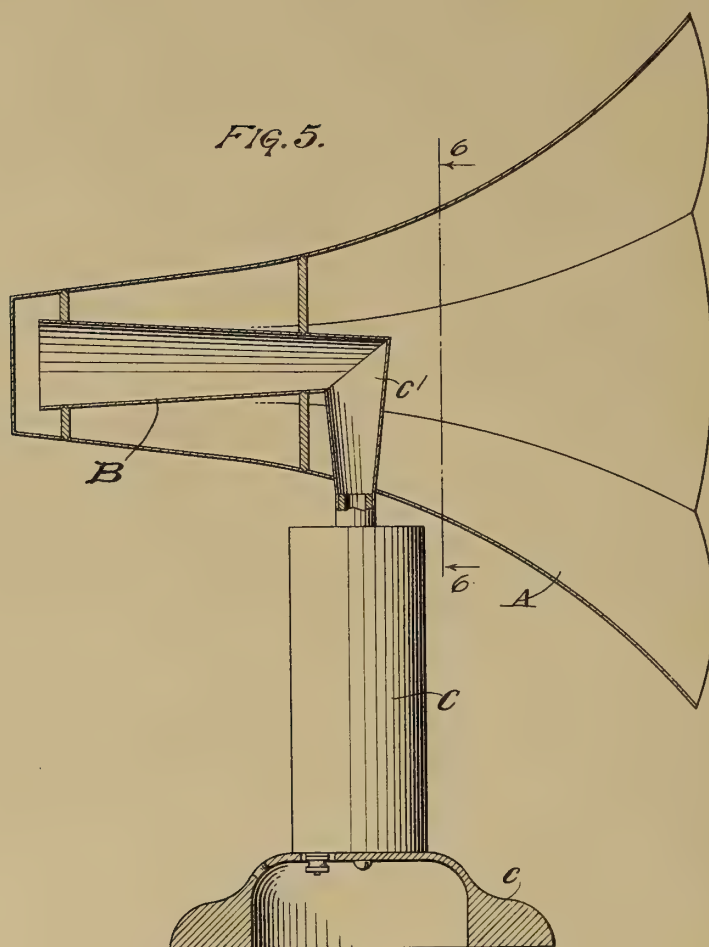
J. J. COMER.

RESONATOR.

APPLICATION FILED JAN. 23, 1911.

Patented Apr. 27, 1915.

4 SHEETS—SHEET 3.



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1,137,187.

J. J. COMER.  
RESONATOR.  
APPLICATION FILED JAN. 23, 1911.

Patented Apr. 27, 1915.

4 SHEETS—SHEET 4.

Fig. 7.

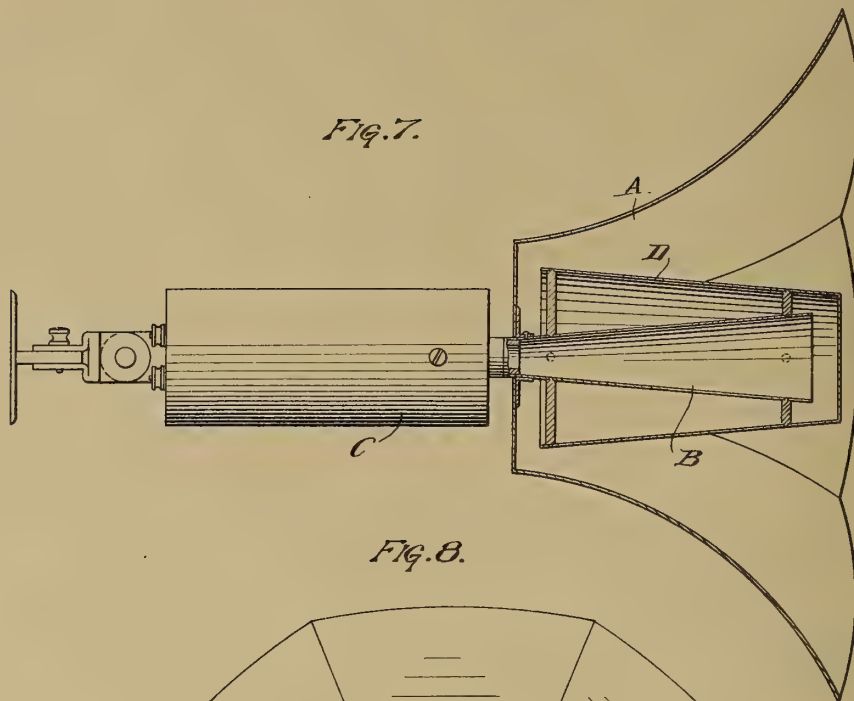
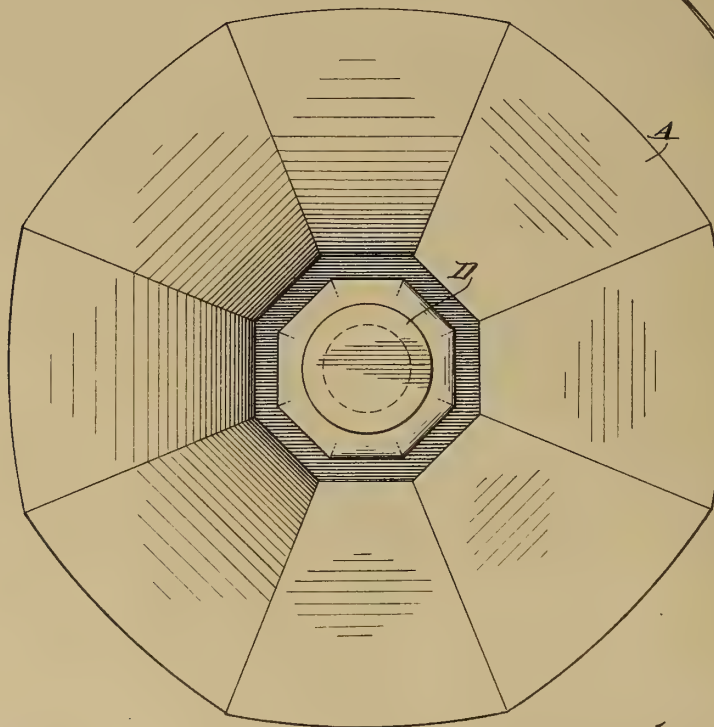


Fig. 8.



WITNESSES

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# UNITED STATES PATENT OFFICE.

JOHN J. COMER, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ENUNCIATOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## RESONATOR.

1,137,187.

Specification of Letters Patent. Patented Apr. 27, 1915.

Application filed January 23, 1911. Serial No. 604,143.

*To all whom it may concern:*

Be it known that I, JOHN J. COMER, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Resonators, of which the following is a specification.

My invention relates to resonators in general, such, for example, as those employed on talking machines, loud-speaking telephones, horns and megaphones, and other things of similar nature.

The principal object of my invention is to provide a construction whereby the length of the resonator may be reduced considerably without impairing the efficiency thereof. In other words, and by my invention, a short resonator is capable of producing as good results as a much longer one of the old style.

It is also an object to provide a resonator adapted more especially for use on loud-speaking telephone receivers for conversational or musical or similar purposes requiring amplification of the sound to produce the desired effect.

To the foregoing and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings—Figure 1 is a longitudinal section of a resonator embodying the principles of my invention, showing a telephone receiver, of the loud speaking type, disposed within the outer or larger end of the resonator, whereby the same may be used, for example, for transmitting music telephonically. Fig. 2 is a front elevation of the structure shown in Fig. 1. Figs. 3 and 4 are similar views showing a different form of my invention. Figs. 5 and 6 are similar views showing still another form of my invention. Figs. 7 and 8 are similar views showing still another form of my invention.

As thus illustrated, and referring more particularly to Figs. 1 and 2, my invention comprises an outer bell-mouthed section A, having its small end closed by a diaphragm or plate *a*, and an inner section B, which latter is also tapered in one direction, but the two sections being disposed in opposite directions. The telephone receiver C is arranged to enunciate into the small end of the

inner section B, and may be of any suitable character. The resonator sections A and B may be of sheet metal or any other suitable material. The larger end of the inner section B is of less diameter than the smaller end of the outer section A, whereby the sound waves coming out of the said inner section will impinge upon the wall *a*, be deflected thereby, and then travel back outside of the inner section and out through the larger end of the outer section A, being thus successively amplified by telescoped resonator sections disposed alternately in opposite directions. In this way a short resonator is capable of producing a resonating effect as good, or substantially so, as with one much longer of the ordinary form. And, moreover, the bell mouth of the resonator becomes the inclosing chamber for the sound-producing device.

Figs. 3 and 4 show substantially the same construction as that previously described, except that in this case the inner section B is reversed, and a third or intermediate section D interposed between said inner section and the outer section A, the construction carrying out the idea of alternately reversing the sections to obtain in a short resonator the effect of a long one of the old type.

In Figs. 1 and 2, the receiver C is supported on the end of the inner section B, and the latter is supported by spiders *b* that are secured to the outer section A in any suitable manner. In Figs. 3 and 4, however, the receiver C is secured to the end wall of the outer section, and the section D is supported by the spider *d* attached to the inner section B, which latter is secured to the receiver.

In Figs. 5 and 6, the construction is practically the same as in Figs. 1 and 2, except that the receiver C, instead of being disposed inside of the resonator, is mounted vertically on a base *c* and connected by an elbow *c*<sup>1</sup> with the inner section B, which latter is supported and arranged relative to the outer section A in exactly the same manner as that shown in Figs. 1 and 2. Here, again, therefore, the resonator, although short, has the same power and effect as a long one of the old style.

In Figs. 7 and 8, the construction is the same as that shown in Figs. 3 and 4, except

that in this case the resonator is made shorter by arranging the receiver C outside of the smaller end of the outer section A, so that the resonator extends in continuation  
5 of the end of said receiver.

Thus my improved resonator contemplates a plurality of telescoped sections disposed alternately in opposite directions. The minimum number of sections is two, while the  
10 maximum number is unlimited. In other words, and as will be seen, this alternate reversal of the sections, one within another, may be carried out indefinitely, thereby in effect increasing the length and size of the  
15 resonator, but without actually increasing the length.

The proportions and adjustment of the sections relative to each other are preferably such that a maximum acoustical effect is  
20 produced, which can be ascertained by moving the sections in and out until the best effect is obtained, which means that the same are in proper acoustical adjustment, and then fastening them in such position.

What I claim as my invention is: 25

In an apparatus of the class described, the combination of a plurality of resonator horns disposed one within the other and tapered in opposite directions and being unrestrictedly open at their larger ends, and provided with perpendicular walls at their  
30 smaller ends, the larger open end of the inner horn being of less diameter than the smaller end of the outer horn within which it is disposed, and spaced annularly and  
35 endwise from the walls of said outer horn, and spacer members positioned adjacent both ends of the inner horn for supporting the inner horn at two separated points within the outer horn and in concentric relation  
40 to said outer horn.

Signed by me at Chicago, Illinois, this  
16th day of January, 1911.

JOHN J. COMER.

Witnesses:

S. LEWIS,  
E. H. CLEGG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

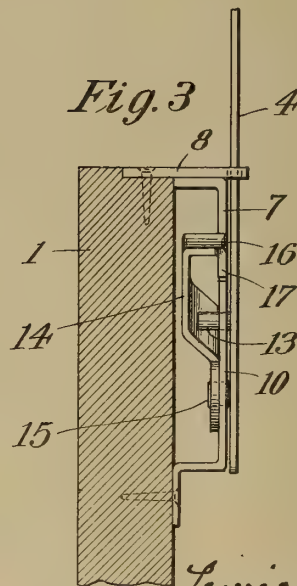
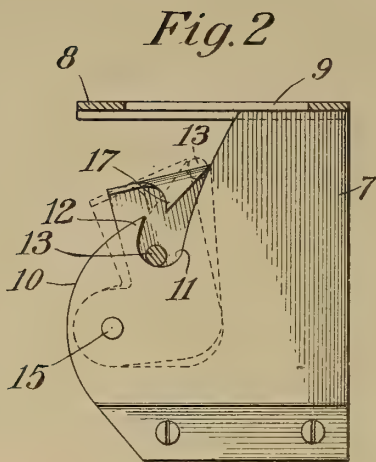
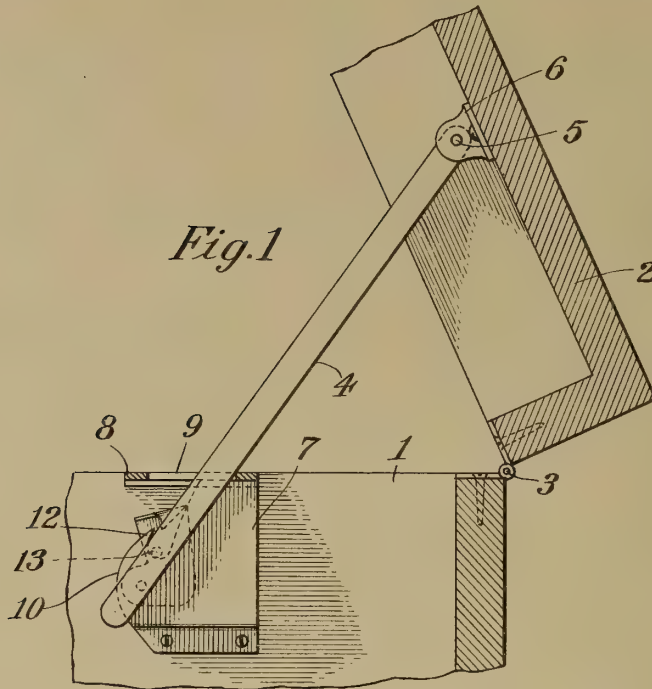


AUTOMATIC LID SUPPORT,  
# 1,137,484-----L.H.Hayes & G.W.Johnson,  
Patented-April 27, 1915.  
Filed-July 30, 1913.

L. H. HAYS & G. W. JOHNSON.  
 AUTOMATIC LID SUPPORT.  
 APPLICATION FILED JULY 30, 1913.

1,137,484.

Patented Apr. 27, 1915.



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 Messrs. Cameron, Lewis & Macdonald*

# UNITED STATES PATENT OFFICE.

LEWIS H. HAYS, OF SPOKANE, WASHINGTON, AND GUSTAF W. JOHNSON, OF MACE, IDAHO, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## AUTOMATIC LID-SUPPORT.

1,137,484.

Specification of Letters Patent.

Patented Apr. 27, 1915.

Application filed July 30, 1913. Serial No. 782,026.

*To all whom it may concern:*

Be it known that we, LEWIS H. HAYS and GUSTAF W. JOHNSON, residents of Spokane, Washington, and Mace, Idaho, respectively, (whose post-office addresses are Spokane, Washington, and Mace, Idaho, respectively,) have invented a new and useful Automatic Lid-Support, which invention is fully set forth in the following specification.

Our invention is an automatic lid-support, intended primarily for a box or other receptacle provided with a hinged cover or lid and having a rigid rod or stay-bar pivoted or otherwise mounted upon the lid, and adapted to be temporarily secured at its lower end, for propping the lid open in raised position. In previous devices of this character, the lid-support has been secured in its raised position as by a thumb-screw or similar catch which requires manipulation,—one hand being employed for lifting (or lowering) the lid while the other hand manipulates the catch or other device. And, although spring-catches have been employed for this purpose, automatically locking the lid-support in its raised position, nevertheless they require manipulation in order to lower the lid,—thus also requiring the employment of both hands.

The object of our invention is to provide automatic means for locking and for releasing the lid-support, so that the lid can be raised and lowered by one hand alone.

Our invention comprises the employment of means, such as a projection on the relatively-movable supporting-rod or lid-support, and a relatively-stationary seat for holding the supporting-rod in its raised position, and means, such as a pivoted dog, for guiding and forcing said projection (when used) into said seat (when used), said dog or other device being operated by subsequent upward movement of the supporting-rod so as to permit said projection to ride over the dog in lowering the lid.

Although, as above stated, our invention is primarily intended for use with a box having a hinged lid or cover, yet it is applicable for use with any movable rod or supporting-member. However, for the sake

of clearness we shall now proceed to describe our invention, in connection with the annexed drawings, as applied to an ordinary box with a hinged cover.

In these drawings, Figure 1 is a sectional view of a portion of a box or lid, giving a side view, partly in section, of a preferred embodiment of our invention, indicating the lid as held secured in its raised position. Fig. 2 is a side view, on a larger scale, of the dog and a portion of the guide-bracket, with another position of the dog indicated by broken lines. Fig. 3 shows a cross-section of Fig. 2.

Referring to these drawings, 1 represents the side of a box or cabinet or other receptacle or inclosure.

2 represents the lid or cover therefor, shown as hinged to the rear thereof at 3.

4 is the supporting member or rod pivoted at 5 to a bracket 6 secured to the lid, and extending into the interior of the box, adjacent the side-wall 1. A relatively-stationary guide for the movable supporting-rod is secured to the side of the box; and preferably consists of a bracket which comprises the vertical plate 7 secured, as at its lower end, to the inner face of the wall 1 and having the horizontal plate 8 at its top, where it may be secured upon the upper edge of the wall 1; and this bracket is preferably provided with the guide-slot 9 (located in plate 8), through which depends the supporting-rod 4. The plate 7 presents on its front and lower edge the cam-projection 10, and above that the cutaway portion or seat 11 with a slightly rearwardly-turned lip 12. From the lower portion of the supporting-rod 4 a projection 13 extends inwardly toward the adjacent side-wall 1, so that it will impinge upon and ride over the cam 10 when drawn upward by the lifting of the lid 2. The effective length of the supporting-rod 4—that is, the distance between its pivot 5 and its projection 13,—is such that when the lid has been raised to the desired extent, the projection 13 has just engaged the flange 16 and is ready to be dropped back into its seat 11.

The dog 14 is a plate, suitably pivoted as



at 15 on plate 7. At its upper edge the dog is provided with the outwardly-turned horizontal flange 16 that is located just above the seat 11 and in the path of the projection 13; and from the outer edge of this flange depends the nose 17 that curves forwardly and extends into the upper portion of the seat 11 (with clearance at the bottom and on each side). Preferably the dog is so pivoted that normally the rear of its flange 16 rests upon the adjacent edge of plate 7. The raising of lid 2 draws the rod 4 upwardly, through the guide-groove 9, until the projection 13 impinges upon and rides over the cam 10, which causes the projection to engage the under side of flange 16 and enter the reëntrant angle formed by nose 17,—the projection abutting against the forward face of the nose. Thereupon, the parts become locked against further upward movement, and the projection 13 can only drop into the seat 11,—the rod and the lid being thus securely held in raised position. Further lifting of the lid, however, carries the projection 13 behind the rear face of nose 17 (tilting the dog out of the way, as indicated in broken lines in Fig. 2); so that the projection 13 can clear the dog altogether, the latter then dropping back to its normal position, with its deflecting-flange 16 interposed to prevent the projection 13 again entering the seat 11 on its downward course; and consequently the lid can now be freely lowered and the box closed by one hand alone. In short, all that has to be done is to raise the lid as far as it will go, whereupon the projection drops back, by gravity, into its seat 13, and the lid is automatically held securely propped open; thereafter, all that is to be done is to first raise the lid slightly (whereupon the dog tilts by gravity, so that its flange 16 automatically cuts off access to the seat 13) and then lower the lid. If desired there may be a pair of such automatic supporting-means, one on each side of the box or receptacle.

We have thus described in full detail a preferred form of our invention, but only for the sake of clearness, since our invention is not limited to the precise construction and arrangement above set forth.

Having thus described our invention, we claim:

1. An automatic lid-support, comprising a rod adapted to be secured to the lid and having a projection, a relatively-stationary guide for said rod having a cam and a seat for said projection, and a pivoted dog located adjacent said seat and extending above said seat and into the path of said projection.

2. An automatic lid-support, comprising a vertically-movable supporting-member, means for supporting the same in its raised

position, a pivoted dog having a flange and nose interposed in the upward path of said member and blocking it against further upward movement beyond its supported position, said dog being deflectable by a succeeding upward movement of said member so as to permit the latter to pass by said dog and then be lowered.

3. An automatic lid-support, comprising a rod having a projection, a stationary seat for said projection, and a pivoted dog extending normally in the path of said projection and normally preventing it from passing upwardly beyond said seat, but tiltable by succeeding upward movement of said projection after first lowering it slightly, so as to permit the latter to pass beyond said dog.

4. An automatic support for the hinged lid of a box or the like, comprising a prop depending from a pivot on the lid and having a projection, a stationary guide for said prop comprising a seat for said projection, and suitable means for preventing said projection being drawn completely through said guide without first being lowered to rest in said seat and thereby support said lid in raised position.

5. An automatic lid-support, comprising a rigid supporting-member, a stationary seat for supporting the same in raised position, and a dog normally preventing the passage of said member beyond the position of being engaged by said seat, said dog being tiltable by a succeeding upward movement of said member after first lowering it slightly and permitting return of the latter.

6. An automatic lid-support, comprising a vertically-movable supporting-member depending from the lid and having a projection, means for supporting the same in its raised position, said means consisting of a stationary guide for said upwardly-moving member having a tortuous passage for said projection, and means to prevent its passage through the same without first seating it in a reëntrant angle of said passage and thereby supporting the lid.

7. An automatic support for the hinged lid or cover of a box or the like, comprising a vertically-movable supporting-member depending from the lid and having a projection, and a guide therefor carried by said box and having a substantially N-shaped passageway for said projection, the parts being so arranged that said projection can be passed completely through said passageway only by lowering it slightly while in its intermediate position within said passage and thereby supporting it in a seat in said N-shaped passage ready to be subsequently passed upward completely through the same.

8. An automatic support for a cover or lid of a box or the like, consisting of the

combination of a rigid prop depending from  
said lid, a stationary support upon said box  
for engaging said prop and holding the lid  
in raised position when the latter has been  
5 opened and then slightly lowered, and  
means positioned to be moved by further  
lifting of said lid and preventing engage-  
ment between the parts aforesaid so as to  
permit free lowering of said lid.

10 In testimony whereof we have signed this

specification in the presence of two subscrib-  
ing witnesses.

LEWIS H. HAYS.

GUSTAF W. JOHNSON.

Witnesses for Hays:

GEO. D. DRYER,

HAROLD HOOKER.

Witnesses for Johnson:

E. DANIELSON,

J. B. OSTRANDER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."





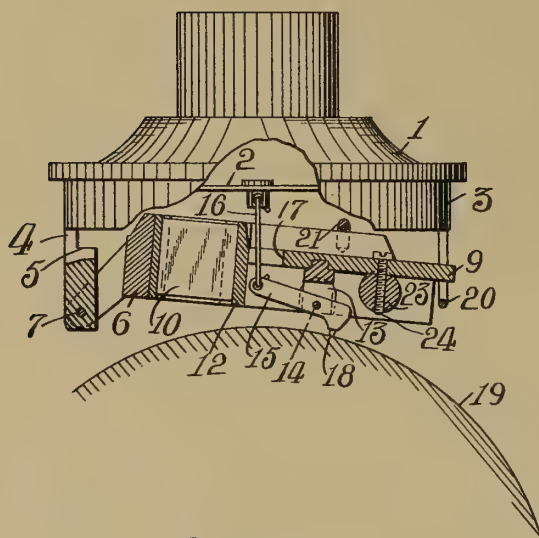
PHONOGRAPH REPRODUCER,  
#1,137,487-----N. H. Holland,  
Patented-April 27, 1915.  
Filed-October 6, 1913.

N. H. HOLLAND.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED OCT. 6, 1913.

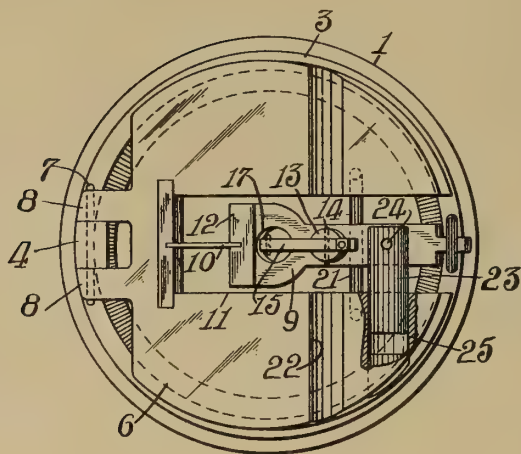
1,137,487.

Patented Apr. 27, 1915.

*Fig. 1.*



*Fig. 2.*



*Witnesses:*

*J. A. Brophy*

*Inventor:*

*Newman H. Holland*  
*by Dyer & Holden*

*His Atty's.*

# UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,137,487.

Specification of Letters Patent. Patented Apr. 27, 1915.

Application filed October 6, 1913. Serial No. 793,547.

*To all whom it may concern:*

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Invention in Phonograph-Reproducers, of which the following is a description.

The present invention relates to phonograph reproducers, and has for its principal object the provision of a reproducer capable of withstanding jarring without causing the stylus to skip from one thread of the record groove to another, thus insuring the exact tracking and reproduction of the record.

In an application of Alexander N. Pierman, Serial No. 685,836, filed March 23, 1912, and entitled Phonograph reproducers, there is described a reproducer in which the stylus lever is carried by a laterally movable member of comparatively small inertia, whereby the stylus is permitted to follow the record groove regardless of the lateral irregularities therein. The present invention contemplates more particularly the improvement of reproducers of this general type. In the said application, the stylus supporting member is connected to the floating weight by a flat spring which, while permitting lateral movement of the stylus lever and its supporting member normally tends to maintain the stylus lever and the member supporting the same in central position and to prevent skipping of the stylus from one record groove to another.

In the present application, improved means, preferably pneumatic, are provided for preventing the skipping of the stylus from one record groove to another.

In order that the invention may be more clearly understood, reference is made to the accompanying drawing forming a part of the specification and in which the same reference characters are used to designate corresponding parts throughout.

In the drawings Figure 1 is an elevation partly broken away and partly in section showing a reproducer constructed in accordance with my invention; and Fig. 2 is a bottom view thereof.

The sound box body 1 is provided with a suitable diaphragm 2, held in position in any suitable manner, and with an annular rim or flange 3. Flange 3 is provided with a depending member 4, which may be of any suitable form, but is here shown as a bracket integral with flange 3, and having a laterally extending lug 5. Floating weight 6 is connected to member 4 in any suitable manner, but preferably by means of a pivot pin or stud 7 carried by a pair of lugs 8, 8 on the weight, the pin being mounted in lug 5. Lugs 8, 8 closely engage the sides of lug 5 to prevent lateral movement of the weight with respect to the sound box. This preferable manner of mounting the weight confines its movement to a direction substantially at right angles to the plane of diaphragm 2. A member 9 of small inertia compared with floating weight 6, is connected to said weight by any suitable resilient means, as for example, by a very thin, flat and sensitive spring 10 of any suitable material, such as spring steel, rigidly connected at its ends to floating weight 6 and member 9 respectively. Part 9 is shown as an elongated member which is preferably mounted in a position substantially parallel with floating weight 6 and within said weight by providing a central recess in said weight of sufficient width to allow considerable lateral movement of the member therein. Resilient member 10 is shown as arranged in a vertical position with one of its ends securely fixed to weight 6, at the center of the wall closing the end of recess 11, while the other end of member 10 is fixed to the flat end 12 of member 9 at its vertical center line. As here shown, the horizontal axis of members 6, 9 and 10 coincide, the construction being such that resilient member 10 normally maintains part 9 in a central position with respect to weight 6.

Mounted on member 9 in any suitable way as by a yoke 13 fastened to the under side of said member and pivot pin 14 is a stylus lever 15 connected to diaphragm 2 in any suitable manner, as by links 16 passing through an aperture 17 provided in said member 9. Stylus lever 15 carries the usual



stylus 18 adapted to track the threads of the record, a portion of which is shown at 19 in Fig. 1.

Lateral movement of member 9 with respect to the diaphragm, and in the example shown also with respect to the floating weight, is confined within limits, by reason of the free end of said member being received in a stirrup 20 depending from the sound box body 1. Member 21 is a brace connecting the separated end portions of weight 6, formed by recess or slot 11. Weight 6 is provided with the usual groove 22 in order that the mounting of stylus lever 15 on member 9 may be readily accessible.

The specific structure hereinbefore described is disclosed in the application hereinbefore referred to of Alexander N. Pierman and forms *per se* no part of the present invention. According to this invention, a member 23, preferably cylindrical in form, is pivoted to the member 9, as by a vertical pivot 24, so as to be capable of movement about said pivot in a direction parallel to the floating weight. Member 23 is slidable or reciprocable in a cylindrical recess 25 formed in the floating weight, said recess extending transversely with respect to the member 9. There is a comparatively close fit between the member 23 and the side walls of the recess 25 so that movement of said member into said recess tends to compress the air in the bottom of the same, and a dash pot action is thereby obtained. Accordingly, although the member 9 and the stylus lever carried thereby are movable laterally to permit the stylus to follow the lateral irregularities in the record groove, any sudden movement thereof such as would be produced by a jar to the reproducer is prevented by the damping action of the dash pot.

It is to be understood that my invention is not limited to the connection of the member 9 to the floating weight by a spring as hereinbefore described, as the said member may be mounted for lateral movement in numerous other ways. Various other changes may be made in the specific structure disclosed without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a phonograph reproducer, the combination with a sound box having a diaphragm mounted therein, of a floating weight mounted on said sound box, a member mounted on said floating weight and free to oscillate laterally with respect to the same, a stylus lever connected to said dia-

phragm and pivotally mounted on said member, and pneumatic means for damping the lateral movement of said member, substantially as described.

2. In a phonograph reproducer, the combination with a sound box having a diaphragm mounted therein, of a floating weight mounted on said sound box, a member mounted on said floating weight and free to oscillate laterally with respect to the same, a stylus lever connected to said diaphragm and pivotally mounted on said member, and a dash pot for damping the lateral movement of said member, substantially as described.

3. In a phonograph reproducer, the combination with a sound box having a diaphragm mounted therein, a floating weight mounted on said sound box, a member mounted on said floating weight and free to move laterally with respect to the same, a stylus lever connected with said diaphragm and pivotally mounted on said member, and a dash pot for damping the lateral movement of said member, said dash pot comprising a reciprocatory member pivotally connected to said laterally movable member, substantially as described.

4. In a phonograph reproducer, the combination with a sound box having a diaphragm mounted therein, of a floating weight mounted on said sound box, a member mounted on said floating weight and free to oscillate in a direction substantially parallel to said floating weight, a stylus lever connected to said diaphragm and pivotally mounted on said member, and pneumatic means for damping the movement of said member parallel to said weight, substantially as described.

5. In a phonograph reproducer, the combination with a sound box having a diaphragm mounted therein, of a member free to oscillate laterally with respect to said sound box, a stylus lever connected to said diaphragm and pivotally mounted on said member, and pneumatic means for damping the lateral movement of said member, substantially as described.

6. In a phonograph reproducer, the combination with a sound box having a diaphragm mounted therein, of a member free to oscillate laterally with respect to said sound box, a stylus lever connected to said diaphragm and pivotally mounted on said member, and a dash pot for damping the lateral movement of said member, substantially as described.

7. In a phonograph reproducer, the combination with a sound box having vibratory means mounted therein, of a stylus lever connected with said vibratory means and free to oscillate laterally with respect to said

sound box, and pneumatic means for damping the lateral movement of said lever, substantially as described.

5 8. In a phonograph reproducer, the combination with a sound box having vibratory means mounted therein, of a stylus lever connected with said vibratory means and free to oscillate laterally with respect to said sound box, and pneumatic means comprising

a dash pot for damping the lateral movement of said lever, substantially as described. 10

This specification signed and witnessed this 3rd day of October, 1913.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,  
MARY J. LAIDLAW.

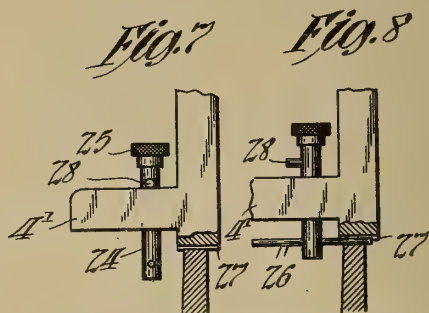
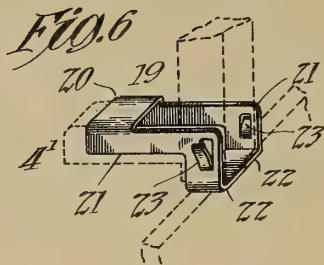
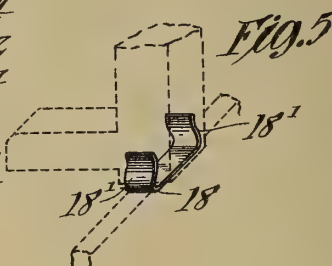
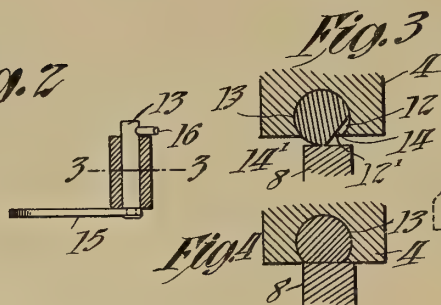
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ATTACHMENT FOR SHAVING MACHINES,  
# 1,137,497-----F. F. Latta,  
Patented-April 27, 1915.  
Filed-January 3, 1911.

1,137,497.



*Witnesses:*  
Frank D. Lewis  
Frederick Bachmann.

*Inventor:*  
*Frank S. Latta*  
*by Frank L. Latta*  
*His Atty.*

# UNITED STATES PATENT OFFICE.

FRANK F. LATTA, OF WADENA, MINNESOTA, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## ATTACHMENT FOR SHAVING-MACHINES.

1,137,497.

Specification of Letters Patent. Patented Apr. 27, 1915.

Application filed January 3, 1911. Serial No. 600,543.

*To all whom it may concern:*

Be it known that I, FRANK F. LATTA, a citizen of the United States, and a resident of Wadena, in the county of Wadena and State of Minnesota, have invented certain new and useful Improvements in Attachments for Shaving-Machines, of which the following is a description.

My invention relates to machines for shaving sound records when it is desired to remove the record surface therefrom, in order that a new surface may be presented to be recorded upon, and more particularly to an attachment for such machines whereby a uniform depth for cuts taken by said machine may be secured by persons having little skill in the operation thereof.

It is customary in preparing for a new impression a sound record which contains a record no longer desired, to take two cuts over the surface. The first of these is intended to remove the old record, and the second to finish the surface for a new record. In taking this second cut, there is a tendency to set the cutting tool too deep; so that the wax-like material forming the record, instead of being shaved off smoothly, is torn off; and the resultant surface is full of pin holes. These holes cause a crackling sound when a reproducer is moved over the new surface; and a record cut in the newly prepared surface by a recording stylus is accordingly imperfect. When the pin holes are numerous, it is difficult to understand the record when the latter is reproduced on a phonograph. Furthermore, as it has heretofore been necessary to stop the shaving machine and use considerable care when adjusting the knife for a second cut, considerable time has been necessary for such an adjustment.

My invention has for its object the obviolation of the above named objections by the provision of a simple attachment adapted to be readily applied to shaving machines whereby a second or finishing cut of a fixed and predetermined amount may be secured by a simple manipulation of the said attachment without stopping the machine.

In order that my invention may be more

fully understood, attention is hereby directed to the accompanying drawing, forming part of this specification and in which:—

Figure 1 is a side view of the preferred form of my improved attachment applied to a well known type of shaving machine, the dotted lines showing the adjustment for a first, or roughing, cut and the solid lines the adjustment for a second, or finishing cut. Fig. 2 is a horizontal section on the line 2—2 of Fig. 1 looking in the direction of the arrow; Fig. 3 is a vertical section taken one the line 3—3 of Fig. 2 and showing my improved attachment in position for a first or roughing cut; Fig. 4 is a similar view, but showing my improved attachment in position for a second or finishing cut. Figs. 5 and 6 are perspective views of modifications of my attachment showing in dotted lines the adjacent portions of a shaving machine; and Figs. 7 and 8 are side views of still another modification, the former view showing my attachment in position for a finishing and the latter view for a roughing cut.

In all the views, like parts are designated by the same reference numerals.

Referring to Fig. 1, 1 represents the frame of a shaving machine having a mandrel 2 for supporting the record 3. An arm or frame 4 carries a clamp 5 for adjustably and removably holding the shaving knife 6, the said arm being supported on the back rod 7 and the straight edge 8 of the frame 1, and being adapted to be moved longitudinally of the record by the feed screw 9 with which coöperates the feed nut 10 carried by the spring support 11 secured to the arm 4 in the manner common in machines of this type.

In the preferred form of my invention, which is shown in Figs. 1 to 4 inclusive, that portion of the arm 4 which is adjacent the straight edge 8 is provided with a recess 12 having an opening 12' immediately above said straight edge. In this recess is rotatably mounted a bar 13 having a flattened side 14 adapted to engage the upper face of the straight edge 8 as shown in Fig. 4, when the said bar is in one of its posi-



tions of adjustment. When the bar 13 is rotated from this position, the curved portion 14' of its periphery is caused to engage the straight edge 8 as shown in Fig. 3 and raise or cam upwardly the forward portion of the arm 4, thereby turning the latter about the back rod 7 as an axis. This pivotal movement of the arm 4 carries the cutting edge of the tool 6 away from the axis of the record 3. In order to permit an easy manipulation of the rod 13, a lever 15 is secured to one end thereof. A pin 16 secured to the other end of the said bar prevents displacement thereof from the recess 12 and, in conjunction with a stop 17 preferably secured to the arm 4, limits the rotation of the said bar in an anti-clockwise direction, as shown in Fig. 1, when the arm 4 is in its elevated position. It is evident that the location, size, and cross section of the bar 13 may be so chosen as to secure any amount of movement of the cutting edge of the tool 6 that may be necessary to attain the desired result. The desired amount of movement of the tool 6 may also be obtained by placing a member of the proper thickness between the opposite faces of the bar 4 and the straight edge 8 and later withdrawing this member. Several means for performing this operation are shown in Figs. 5 to 8 inclusive.

In Fig. 5, 18 is a flat strip preferably made of sheet metal having a central portion adapted to be placed between the bar 4 and straight edge 8 and having resilient extremities 18', 18' upwardly and inwardly bent and detachably engaging opposite sides of the bar 4.

In the modification shown in Fig. 6, the strip 19 is provided with a section 20 adapted to engage the top of the projection or fingerhold 4' on the arm 4, two resilient side members 21, 21 integral with the said section and adapted to engage the sides of said arm, and two lips 22, 22 respectively integral with the said side members and adapted to be inserted between the bar 4 and the straight edge 8. Two ears 23, 23, preferably stamped outwardly from the side members 21, 21 respectively, are adapted to be engaged by the fingers of the operator of the machine to shift the position of the strip 19.

In the modification shown in Figs. 7 and 8, a vertical rod 24 having a knurled head 25 at one end and a transverse pin 26 at the other end is rotatably mounted in the extension 4'. By raising the arm 4, and rotating the rod 24, the pin 26 can at will be either inserted between or withdrawn from engagement with the said arm and the straight edge 8. A notch 27 in the arm 4 in which the upper part of the pin 26 is engaged when the said arm is in its raised position, prevents accidental displacement

of the said pin; and a stop 28 secured to the rod 24 adjacent the knurled head 25 limits the downward movement of the said rod.

In operation, the record or blank to be shaved is placed on the mandrel 2, the arm 4 is elevated by my improved attachment, and the knife 6, having been adjusted toward and into engagement with the record through the clamp 5 and locked in place, is fed along the record to take a first or roughing cut. When it is desired to take a finishing cut, the desired adjustment of the cutting tool can be obtained by lowering the arm 4 into engagement with the straight edge 8 either by raising the lever 15 when the modification shown in Figs. 1 to 4 inclusive is employed or by removing the members inserted between the arm 4 and the straight edge when the modifications shown in Figs. 5 to 8 inclusive are employed, when the finishing cut can be taken without further adjustment of the knife 6. By the employment of the spring 11 for supporting the feed nut 10 from the arm 4, the feed nut is held firmly in engagement with the feed screw for both roughing and finishing cuts.

While my improved attachment is primarily designed for adjusting the tool in taking second cuts, it may obviously be employed for such an adjustment when any cut is being taken. In such a case, the arm 4 is elevated, the tool is placed very lightly in engagement with the record surface, and the said arm being then lowered, the cut is taken. Furthermore, while several means for carrying my invention into effect have been shown by me, various other means may be employed; and my invention is limited only as defined by the terms of the appended claims.

Having now described my invention what I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a device of the class described, the combination with a record support, of a shaving knife, supporting means for said knife, said knife being adjustable with respect to said supporting means in a direction toward said record support, and positioning means comprising a cam member having a flattened bearing surface, said positioning means coacting with said supporting means and being operable without alteration of the position of said knife with respect to said supporting means to cause movement of said knife toward said record support an amount always equal to a predetermined depth of cut for said knife, substantially as described.

2. The combination with a record support, of a shaving knife, supporting means for said knife, said knife being adjustable with respect to said supporting means in a

direction toward said record support, positioning means comprising a cam having a flattened bearing surface, said positioning means coacting with said supporting means and being operable without alteration of the position of said knife with respect to said supporting means to cause movement of said knife toward said record support an amount always equal to a predetermined depth of cut for said knife, and means for producing a relative feeding movement between said supporting means and said record support, said feed producing means being operative for different positions of operation of said positioning means, substantially as described. 15

This specification signed and witnessed this 26th day of Dec. 1910.

FRANK F. LATTA.

Witnesses:

H. J. MAXFIELD,  
GEO. E. HARRIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first of these is the fact that the  
the second is the fact that the  
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the twenty-eighth is the fact that the  
the twenty-ninth is the fact that the  
the thirtieth is the fact that the



# 1,137,883-----TALKING MACHINE,  
-----T. Metzeler,  
Patented-May 4, 1915.  
Filed-April 6, 1914.

1,137,883.

2 SHEETS—SHEET 1.



Fig. 2.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

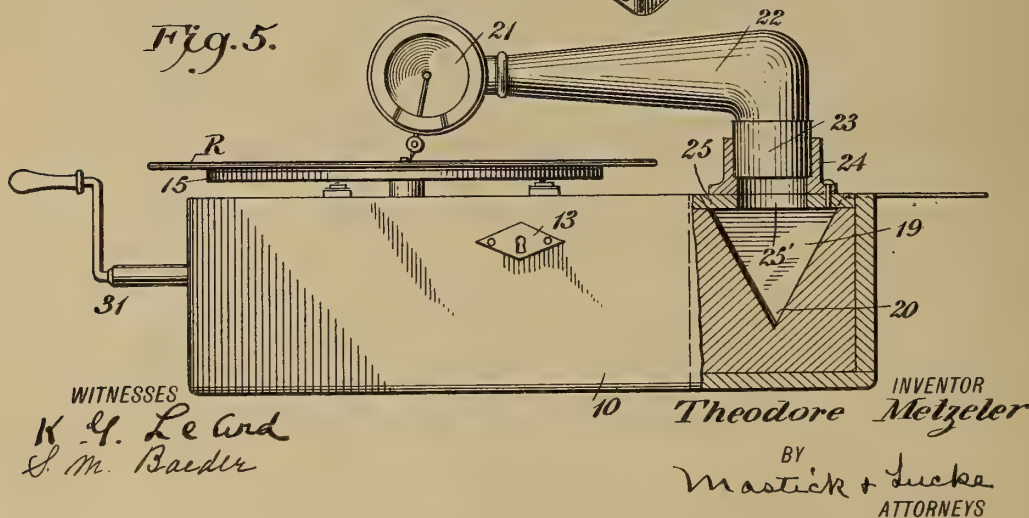
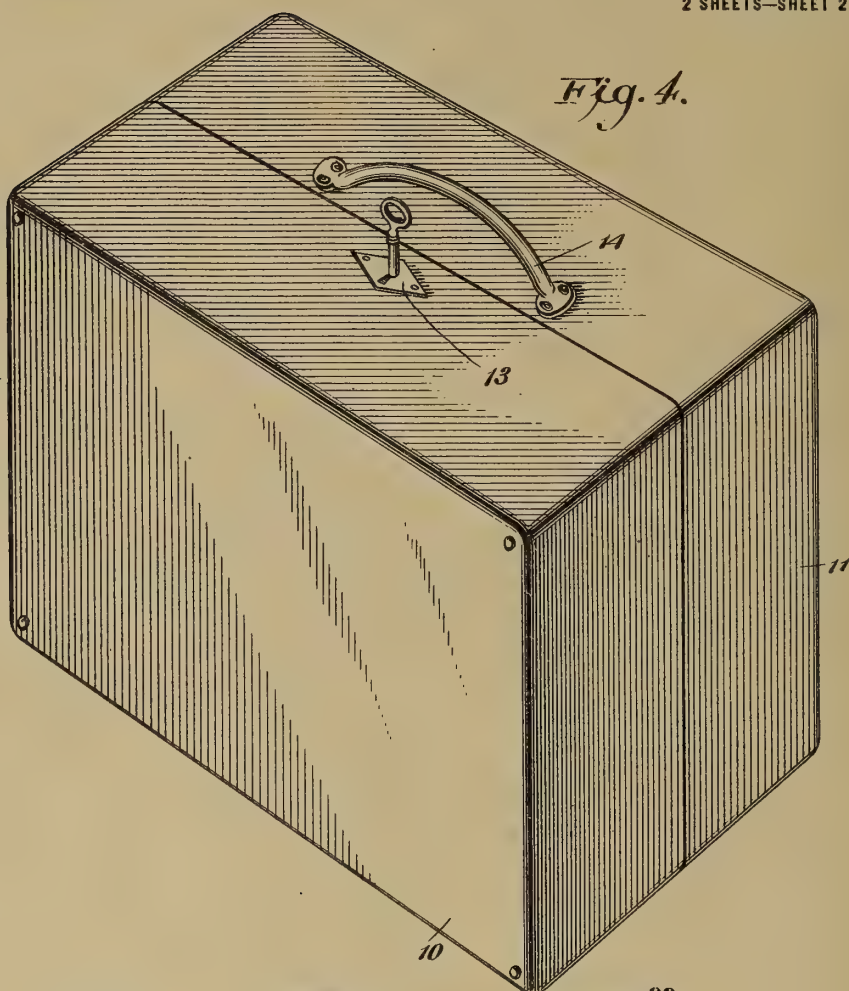




T. METZELER.  
TALKING MACHINE.  
APPLICATION FILED APR. 6, 1914.

1,137,883.

Patented May 4, 1915.  
2 SHEETS—SHEET 2.



# UNITED STATES PATENT OFFICE.

THEODORE METZELER, OF NEW YORK, N. Y.

## TALKING-MACHINE.

1,137,883.

Specification of Letters Patent.

Patented May 4, 1915.

Application filed April 6, 1914. Serial No. 829,822.

*To all whom it may concern:*

Be it known that I, THEODORE METZELER, a citizen of the United States of America, and a resident of the borough of Brooklyn, county of Kings, city of New York, State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to talking machines and has as its objects the production of such machines in a simple, compact and portable form; the production of such machines which may be used without an amplifying horn but will still give an amplified sound in a manner pleasing to the ear, together with means for intermittently damping the sound so as to produce the effect of a swell in tone. I accomplish these objects by extremely simple and inexpensive means together with other objects as will hereinafter appear.

The preferred form of device is so constructed as to simulate a dress-suit case, with a smooth, unbroken outer surface, without unseemly or conspicuous projections or projecting apparatus of any kind extending through any portion of it. To arrange the talking machine apparatus and the necessary records, preferably in disk form, within such comparatively flat and thin space is also one of the objects of my invention.

In the following I have described, in connection with the accompanying drawings, the preferred form of my invention, the features thereof being more particularly set forth hereinafter in the claims.

In the drawings Figure 1 is a perspective view of one form of my talking machine, with the casing open and the parts assembled ready for the closing of the casing and for transportation; Fig. 2 is a detail of one portion of the casing on the broken line 2—2 of Fig. 1, showing a means for supporting the reproducer arm, when not in use, in the cover or lid of the casing; Fig. 3 is a sectional view, parts being broken away, on the line 3—3 of Fig. 1, showing the relation of the disk records to the cover of the casing and the cushioning belt holding the records in place and preventing them from being damaged by the other parts of the machine; Fig. 4 is a perspective view of the casing closed; and Fig. 5 is a front elevation showing the talking machine proper in operative position, the resonance chamber or sound amplifying box being shown in transverse vertical section.

Similar numerals of reference indicate similar parts throughout the several views.

As shown in the drawings the casing comprises two portions, 10 and 11, portion 10 being adapted to contain the talking machine apparatus proper, as hereinafter referred to, and portion 11 being adapted to contain the disk records and reproducer arm when not in use, and to act as a cover to the portion 10. Portions 10 and 11 are shown as hinged together by hinges 12, 12, and provided respectively with a hasp or lock 13 for securing the two portions together when in closed position, and with a handle 14 for the ready carrying of the apparatus. 15 indicates a disk support mounted to rotate on motor shaft 16 in the usual manner, the shaft 16 being driven by any suitable motor mechanism (not shown) housed in portion 10 of the casing beneath disk support 15. 17 indicates a suitable brake device for controlling the starting and stopping of disk support 15 and 18 a suitable regulating device for the motor. These features constitute no part of my invention and may be of any well-known and suitable construction.

19 indicates the resonance chamber or sound amplifying box arranged at one end of portion 10. The walls of chamber 19 are of a suitable resonant material, such as wood, and the chamber is preferably V-shaped in cross section as shown in Fig. 5, the ends of the chamber being sloped or beveled from the top toward the bottom thereof as shown in Fig. 1, the chamber, as shown, being thus in the form of a triangular prism extending across the end of portion 10 with the end walls of the chamber flaring outwardly and upwardly.

The reproducer 21, as well as the reproducer arm 22, may be of any ordinary and well known type and construction.

23 indicates a collar at the end of the reproducer arm, adapted to have pivotal connection with said arm and to be fitted downwardly within socket piece 24 carried by bridge 25 extending across the middle portion of resonance chamber 19. The bridge 25 is preferably made of wood and is provided with an aperture 25' registering with the opening in socket piece 24. The sound waves from the reproducer are thus conveyed by the reproducer arm through socket piece 24 and aperture 25' into resonance chamber 19 whence the sound waves emerge



through the spaces at either side of bridge 25. The form of resonance chamber described has proved to give a very clear, sweet and loud amplification of the sound waves coming from the reproducer and without the necessity of using an amplifying horn, or other sound conveying conduit.

As the machine is especially designed for ready portability in complete form ready for use at picnics or other transient entertainments, the casing is adapted to provide means for accommodating a considerable number of records, the whole device being a complete single, unitary or self contained apparatus. The records are indicated by R and are shown as housed within portion or cover 11 of the casing, and held in place by a strap 26. As shown, I have employed a strap having its outer ends attached to cover 11 at points 27 and 28, the inner ends being adjustably connected by buckle 29. The sizes of the casings may be varied to accommodate records of different diameters, the casing being preferably so constructed that the disks are in tangential contact with the opposite inner walls and one end of the same. The strap 26 holds the disks in place on the free side and forms a cushion for the disks against the end wall of the casing. Strap 26 moreover prevents the records from contacting with the socket piece 24 or shaft 16 should they project sufficiently into the cover when the casing is closed, both the strap and the socket and shaft being preferably so alined as to be superposed when the casing is closed. For this reason the strap is preferably made of fabric or other soft flexible material which will not damage or abrade the records and constitutes, in effect, a cushioning device preventing the records from coming into any damaging or abrading contact with any other part of the device, especially while undergoing transportation.

When disassembled and the casing is ready to be closed the reproducer and its arm are supported in cover 11, by frictional contact between sleeve 23 and socket piece 24<sup>a</sup>, as well as by being seated in recessed block 30 secured at one end of the cover. Block 30 is also provided with a notch or recess 30' at the bottom into or through which the shank of winding crank 31 is slipped to hold the same securely in position.

32, 32, indicate dampers or sound deadeners hinged or otherwise secured at one side of the openings into resonance chamber 19 and at either side of bridge 25. The deadeners 32 may be felt covered to fit more or less tightly into said openings, the hinges 33, being adapted to hold them in any desired position or to permit them to be swung entirely away from said openings. By more or less closing and opening either one or both of said deadeners the sound issuing from the resonance box can be produced

with more or less swell as desired or the full effect of the amplified sound from the resonance chamber can be obtained by leaving the openings thereto entirely free either by folding back said deadeners or by removing them altogether.

It is obvious that many of the details of construction and arrangement may be varied without departing from the spirit of the invention and I do not restrict myself to such details further than the scope of the appended claims demands.

What I claim and desire to secure by Letters Patent is:—

1. In a talking machine, a casing member, motor mechanism housed in said casing, a resonance chamber in said casing adjacent said motor mechanism, a bridge over a portion of said resonance chamber, said resonance chamber opening upward adjacent said bridge, means for deadening the sound from the resonance chamber; and reproducer means supported by said bridge and in communication from above with said resonance chamber, the sound waves being directed downwardly into said resonance chamber and then upwardly therethrough.

2. In a talking machine, a casing member, motor mechanism housed in said casing, a resonance chamber in said casing adjacent said motor mechanism, said resonance chamber comprising a V-shaped chamber having upwardly and outwardly flaring ends, a bridge over a portion of said resonance chamber and reproducer means supported by said bridge and in communication with said resonance chamber.

3. In a talking machine, a casing member, motor mechanism housed in said casing, a resonance chamber in said casing adjacent said motor mechanism, said resonance chamber comprising a V-shaped chamber having upwardly and outwardly flaring ends, a bridge spanning the middle portion of said chamber leaving sound openings at either side of said bridge and reproducer means supported by said bridge and in communication with said resonance chamber.

4. In a talking machine, a casing member, motor mechanism housed in said casing, a resonance chamber in said casing adjacent said motor mechanism, said resonance chamber comprising a V-shaped chamber having upwardly and outwardly flaring ends, a bridge spanning the middle portion of said chamber leaving sound openings at either side of said bridge, means for deadening the sound from said sound openings and reproducer means carried by said bridge and in communication with said resonance chamber.

5. The herein described talking machine comprising in combination, a casing composed of two substantially similar casing portions hinged together along adjacent edges, one



of said portions constituting a base or bottom for the machine and adapted to house the motor mechanism and including a resonance chamber opening upward adjacent  
 5 said motor mechanism, the other of said portions constituting a housing for a collection of records and also including means for supporting in definite position for transportation the detachable parts of the machine, and  
 10 means adapted to cooperate with the collection of records to prevent abrasion of damage thereof.

6. The herein described talking machine comprising a cabinet consisting of two substantially equal portions hinged together at their adjacent edges and one being adapted to fold over or close upon the other, one of said portions constituting a base and housing the motor mechanism, the end of said  
 20 portion constituting a sounding box having a concavity of triangular prismatic form, the same extending from one end to the other of one end of the base, reproducer means, a bridge spanning the middle portion of said sounding box concavity, and a  
 25 tubular socket piece secured to said bridge and adapted to receive the end of the reproducer means whereby the sound is directed downwardly through the bridge and delivered in both directions laterally therefrom  
 30 from the aforesaid concavity.

7. In a talking machine, the combination with a box-like base adapted to house operating and controlling devices for a record,

one end of the base constituting a sounding 35 box, a bridge extending across the middle portion of said sounding box and dividing the mouth thereof into two equal portions opening upwardly, said bridge having a hole formed downwardly therethrough, a 40 tubular socket piece secured to the bridge and registering with said hole, and reproducer means having a thimble at one end adapted to be fitted in said socket piece.

8. The herein described portable talking 45 machine comprising a box-like cabinet consisting of two parts hinged together, one part constituting a base adapted to house the motor mechanism and controlling means therefor and also including a sound ampli- 50 fier comprising a chamber open at the top adjacent said motor mechanism, and a reproducer arm support secured adjacent said sound amplifier, the other portion of the cabinet being adapted to house for transportation 55 a collection of disks and having a supporting means for the reproducer arm and motor crank for securing them in fixed position, and a flexible pad or strap adapted to extend across the disks to protect them 60 from abrasion.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THEODORE METZELER.

Witnesses:

SEABURY C. MASTICK,  
 K. G. LE ARD.



SOUND BOX,

# 1,137,911-----A. W. Schmidt,

Patented-May 4, 1915.

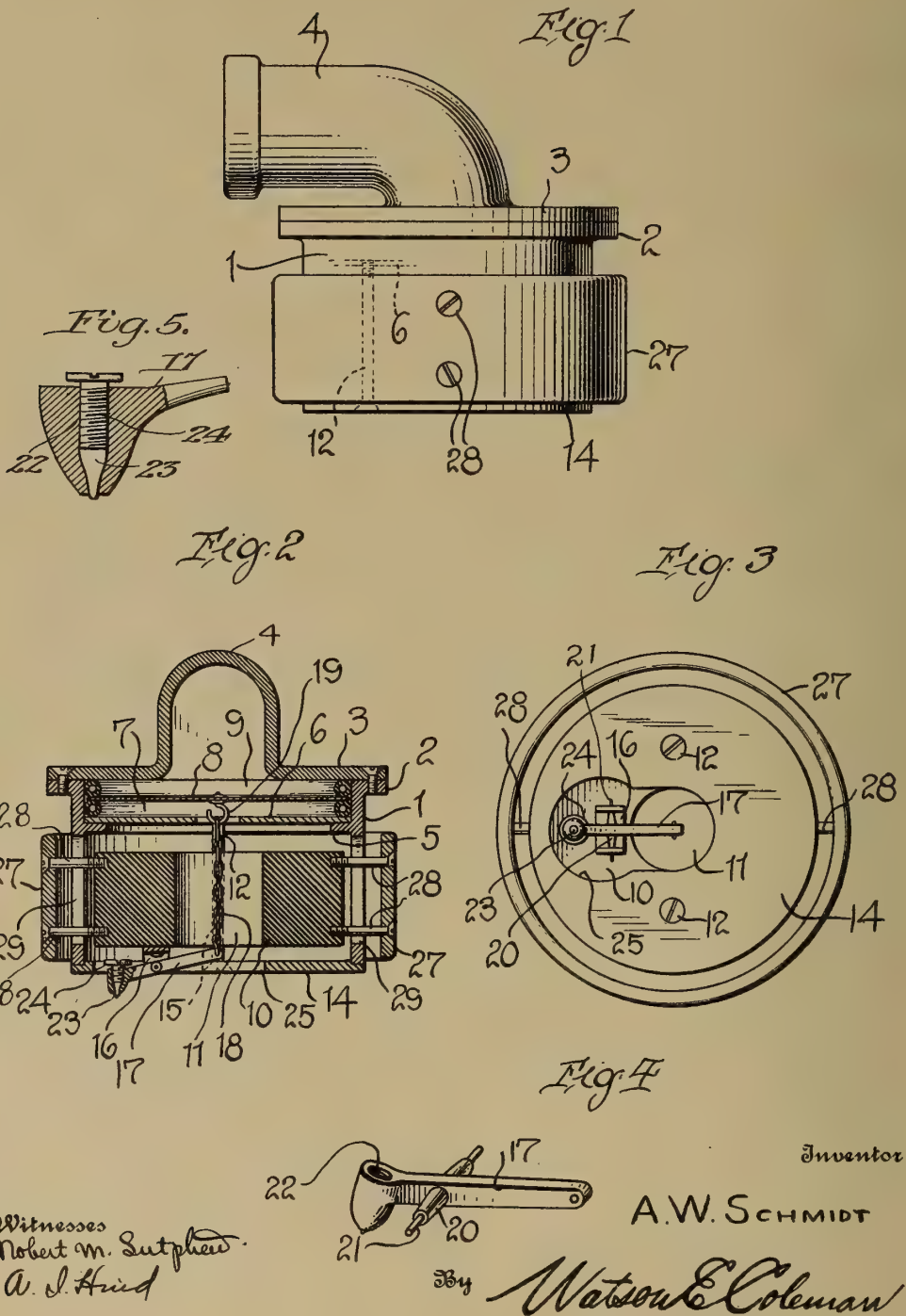
Filed- June 17, 1914.



A. W. SCHMIDT.  
SOUND BOX.  
APPLICATION FILED JUNE 17, 1914.

1,137,911.

Patented May 4, 1915.



Witnesses  
Robert M. Sutphen.  
A. J. Hurd

Inventor

A. W. SCHMIDT

By

Watson & Coleman

# UNITED STATES PATENT OFFICE.

ANNIE W. SCHMIDT, OF OAKLAND, CALIFORNIA.

SOUND-BOX.

1,137,911.

Specification of Letters Patent.

Patented May 4, 1915.

Application filed June 17, 1914. Serial No. 845,685.

*To all whom it may concern:*

Be it known that I, ANNIE W. SCHMIDT, a subject of the Emperor of Austria-Hungary, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to certain improvements in sound boxes; and an object of the invention is to provide a novel and improved device of this general character whereby the same may be assembled and applied with 15 convenience and facility and wherein the possibility of metallic vibration is substantially entirely eliminated.

Furthermore, it is an object of the invention to provide a device of this general character including a jewel stylus and wherein 20 such stylus may be applied to or removed from operative position with expediency and convenience.

The invention also has for its object to 25 provide a device of this general character of a novel and improved construction wherein the same is maintained substantially against movement relatively to the traveling surface with which it coacts and wherein the stylus 30 is operatively connected with a movable non-metallic mass which is substantially free of contact with the remaining elements of the sound box.

It is also an object of the invention to provide a novel and improved device of the character set forth including an external ring through the manipulation of which the stylus may be adjusted relatively to the traveling surface with which it coacts.

40 It is also an object of the invention to provide a device of this general character of a novel and improved construction and whereby the diaphragm included therein is protected in such a manner as to reduce to 45 a minimum the possibility of injury thereto.

The invention consists in the details of construction and in the combination and arrangement of the several parts whereby 50 certain important advantages are attained and the device is rendered simpler, less expensive and otherwise more convenient and advantageous for use, all as will be hereinafter more fully set forth.

The novel features of the invention will be carefully defined in the appended claims. 55

In order that my invention may be the better understood I will now proceed to describe the same with reference to the accompanying drawings, wherein—

Figure 1 is an elevational view of a sound 60 box constructed in accordance with an embodiment of my invention, certain of the interior parts being indicated by dotted lines for convenience of disclosure; Fig. 2 is a vertical sectional view taken through the 65 device as illustrated in Fig. 1; Fig. 3 is a bottom plan view of the device as herein included; Fig. 4 is a view in perspective, detached, of the stylus arm herein included; and Fig. 5 is an enlarged vertical sectional 70 view taken through the end of the stylus arm and illustrating in detail the mounting of the stylus therein.

As disclosed in the accompanying drawings, 1 denotes a cylindrical casing provided 75 at one of its ends with the laterally directed annular flange 2 to afford a means whereby the cover or cap 3 may be suitably anchored thereto, said cover or cap 3 being provided with a mouth piece 4 of any ordinary or preferred configuration. In close proximity 80 to the flanged end of the cylindrical casing 1 and in predetermined spaced relation thereto is the inwardly disposed annular flange 5 serving as a support for the seat ring 6 on 85 which is adapted to be rested the annular hollow tube 7 formed preferably of rubber, and on which the diaphragm 8 is adapted to be rested and interposed between the diaphragm and the cover 4, when in applied 90 position, is a second annular tubular member 9 also formed preferably of rubber. By this arrangement, it will be readily perceived that the diaphragm 8 will be effectively maintained in operative position and 95 so protected as to reduce to a minimum the possibility of injury thereto.

Positioned within the casing 1 and capable of reciprocal movement therein is the piston 10 having an axial bore 11, for a purpose 100 to be hereinafter more particularly set forth. The piston 10 is of a diameter less than the interior diameter of the casing 1 so as to be free of contact therewith when in applied position, and I prefer that such piston 105 be produced from a non-metallic



mass, such as lignum-vitæ, hard rubber or the like.

As herein disclosed, the piston 10 is guided in its movement through the medium of the screws 12 operatively engaged with the seat ring and the bottom cover 14 and disposed through suitable openings, provided in the piston. By this arrangement, it will be perceived that the screws 14, in addition to affording a requisite guide for the piston 10, afford an effective means for maintaining the bottom cover 14 and the seat ring 6 in operative assemblage.

The piston 10 is of a predetermined length less than the length of the casing and to the under surface thereof at one side of the opening 11 therethrough is suitably affixed the saddle 16, in which is pivotally mounted the rock arm 17, the tail whereof terminating below the opening 11 and having secured thereto a flexible member 18 which in turn is operatively engaged with the anchor member 19 carried by the diaphragm 8 at substantially its axial center. As herein disclosed, the arm 17 is provided at a predetermined point intermediate its length with the opposed trunnions 20 adapted to snugly fit within the saddle 16 and through which the pintle or pin 21 is directed whereby it will be perceived that an operative engagement of the arm with the saddle is produced in a convenient and effective manner.

The arm 17 is provided at its lower extremity with an opening 22 in which is adapted to be set the jewel stylus 23, the projecting point whereof being so shaped as to properly coact with the grooves of the traveling supporting surface with which it is adapted to coact, such traveling supporting surface being either in the nature of a cylinder or a disk, as I have found in practice that my sound box may be employed with equal facility with different forms of record. In order that the stylus may be held within the opening 22 in such a manner as not to become loosened or be susceptible to any possible vibration, I have said opening threaded so that the tap 24 may be properly engaged therein and bear firmly against the stylus, it being perceived that the lower portion of the opening 22 and the adjacent portion of the stylus are so formed as to prevent the stylus from passing entirely therethrough and for limiting the degree of projection of the point of the stylus. It will also be observed that the bottom cover 14 is provided with a suitable opening 25 in order to permit the requisite projection of the stylus to properly engage its coating traveling surface.

The casing 1 is provided with diametrically opposed elongated slots or openings 29 disposed longitudinally or endwise of the casing so that an operative connection may be had between the annular member or ring 27 loosely surrounding the casing and the

piston 10; and, as herein disclosed, this connection is created through the medium of the headed screws 28 directed through the annular member 27 and in threaded engagement with the piston 10. By this arrangement, it will be readily perceived that the stylus 23 may be retracted or projected, as the necessity may require, by imparting movement to the annular member 27, the downward movement of the piston being controlled by contact of the lowermost screws 28 with the lower ends of the slots 26.

By having the stylus arm 17 supported by the movable piston, the casing 1 may be substantially immovably supported, which arrangement I have found in practice to be especially advantageous.

From the foregoing description, it is thought to be obvious that a sound box constructed in accordance with my invention is of an extremely simple and comparatively inexpensive nature and is particularly well adapted for use by reason of the convenience and facility with which it may be assembled, and it will also be obvious that my invention is susceptible of some change and modification without material departure from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice.

I claim:

1. A sound box comprising a casing, a diaphragm positioned therein, a piston within the casing, a stylus carried by the piston, an operative connection between the stylus and the diaphragm, a member surrounding the casing and capable of movement relatively thereto, and an operative connection between the movable member and the piston.

2. A device of the character described comprising a casing provided with elongated slots, a diaphragm positioned within the casing, a piston mounted within the casing, a stylus carried by the piston, an operative connection between the stylus and the diaphragm, a member surrounding the casing and capable of movement relatively thereto, and a connection between the member and the piston disposed through the slots of the casing.

3. A sound box comprising a casing, an inwardly disposed flange within the casing, a seat ring seated on the flange, a cover member for the casing, a diaphragm interposed between the seat ring and the cover, a piston within the casing, a cover for the opposite end of the casing, a stylus carried by the piston, an operative connection between the stylus and the diaphragm, and guiding means for the piston connecting the second cover and the seat ring.

4. A sound box comprising a casing, an



inwardly disposed flange within the casing,  
a seat ring seated on the flange, a cover  
member for the casing, a diaphragm inter-  
posed between the seat ring and the cover,  
5 piston within the casing a cover for  
the opposite end of the casing, a stylus  
carried by the piston, an operative connec-  
tion between the stylus and the diaphragm,  
and guiding means for the piston connecting

the second cover and the seat ring, said 10  
guiding means serving to maintain said sec-  
ond cover and said ring in operative position.

In testimony whereof I hereunto affix my  
signature in the presence of two witnesses.

ANNIE W. SCHMIDT.

Witnesses:

H. J. LEWIS,

CATHERINE CALLAHAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."



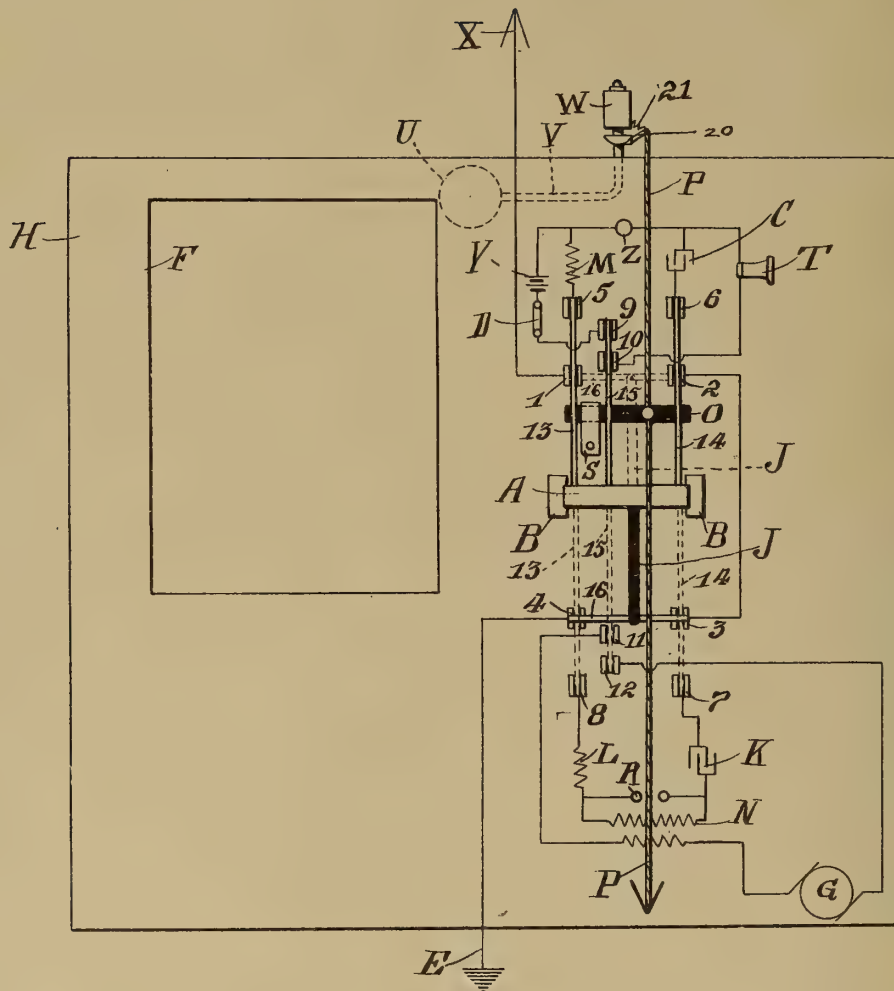
COMPOSITE ELECTRIC SIGNALING SYSTEM,  
# 1,138,013-----W. H. Phinney,  
Patented-May 4th, 1915.  
Filed-October 21, 1907.



W. N. PHINNEY.  
COMPOSITE ELECTRIC SIGNALING SYSTEM.  
APPLICATION FILED OCT. 21, 1907.

1,138,013.

Patented May 4, 1915.



Attest:  
*C. S. Ashley*  
C. S. Ashley

Inventor:  
by *Warren H. Phinney*  
*Phil Farnsworth* Atty

# UNITED STATES PATENT OFFICE.

WARREN N. PHINNEY, OF BOSTON, MASSACHUSETTS.

COMPOSITE ELECTRIC SIGNALING SYSTEM.

1,138,013.

Specification of Letters Patent.

Patented May 4, 1915.

Application filed October 21, 1907. Serial No. 398,338.

*To all whom it may concern:*

Be it known that I, WARREN N. PHINNEY, a citizen of the United States of America, and a resident of the city of Allston, Boston, Massachusetts, have invented certain new and useful Improvements in Composite Electric Signaling Systems, the principles of which are set forth in the following specification and accompanying drawings, which disclose the form of the invention which I now consider to be the best of the various forms in which the principles of the invention may be embodied.

This invention relates to signaling systems, particularly for use in warning ships of imminent danger.

The object of the invention is to provide such a system as shall be operative between a ship and an invisible danger point, such as another ship or a shoal or rock, which may have visual signals thereon, but which are obscured by fog, storm or darkness.

A further object of the invention is to provide such a system as will be operative between a ship and a danger point, when the distance between them is so comparatively slight that further progress may be extremely dangerous, such distances being those measured by the audibility of the ordinary steam-fog-horn or siren which are capable of producing sound-waves transmissible to a considerable distance. Such sound-signals, while conveying more or less accurate intelligence as to the direction of their source of emanation, are extremely deceptive and misleading with respect to the conveyance of an idea as to the distance of the place of reception of the sound from the place of its production.

An object of the invention, therefore, is to provide a system which will furnish intelligence as to the distance as well as the direction of the place of danger constituting the transmitter of the system, thereby not only warning the pilot to take instant action in case of immediate danger, but also permitting him to proceed forward without fear and without losing time or steerage way in case of absence of danger.

The invention involves, fundamentally, the well-known enormous difference in time-

transmission between electromagnetic or so-called electric waves, and sound waves.

The drawing is a diagrammatic illustration of an embodiment of the invention, which, as to physical embodiment, is extremely simple and therefore practicable and useful in operation.

H may represent a ship's pilot house or a portion of a light house, in which the apparatus is installed; and F a window-opening for the look-out. Any suitable wireless telegraphy apparatus may be installed in the pilot house, and supplied with electrical energy for transmission of signals by any suitable generator G, which, as the required distances of transmission are only a few miles, may be of extremely low power, such as of a battery of a few cells furnished with the usual interrupter with the transformer or induction coil N. In receiving signals the pilot may use the telephone T, which may be adapted to be applied to only one ear, leaving the other ear uncovered to listen to the sound of a distant whistle.

Each intercommunicating system is to be provided with apparatus similar to that shown, and consisting of both transmitting and receiving means for electric waves, and also a steam fog-horn or siren or other adequate sound-producing means.

The electric wave transmitting means may comprise, in addition to generator G and transformer N, the inductance L, condensation (*i. e.*, capacity) K and spark-gap R, all connected together and to the switch points 7 and 8 so as to be included within the main or aerial circuit X—E, which may be any desired form of known circuit for the purpose.

An oscillating switch-member A is pivoted in bearings B, B, and carries a part J, to the end of which is secured a conducting bar 16 supported on switch-member J and connecting switch-points 3 and 4 together to connect the upper part X of the aerial circuit with the lower part E, such as earth. Normally the connection is such as to operatively include the receiving apparatus with the aerial circuit X—E, the transmitting apparatus being normally cut out from co-operation with the aerial circuit, as shown.



When it is desired to employ the installation to transmit signals, the rope or string P, attached to switch-member O, is pulled downward to bring the switch blades 13 and 14 into the position shown in dotted lines, and to simultaneously oscillate the conductor 16 from the position shown in full lines. The result is to disconnect switch-points 3 and 4 from each other and to connect them respectively to points 7 and 8 thereby connecting to the aerial circuit, the apparatus included in the oscillation circuit K, R, L. The switch-member A carries also a conducting blade 15, and when the rope P is pulled downward, this is moved into its dotted line position to connect switch-points 11 and 12 together, thus closing the circuit of generator G through the primary of induction coil N and causing the production of high frequency oscillations which result in the radiation of electric waves from antenna X—E. The switch blades 13, 14 and 15 oscillate above the plane of the drawing, while conducting bar 16 oscillates below the plane.

The rope P is also connected, in any usual way, to the fog-horn, siren, or whistle W, of any known construction, so that when the rope is pulled the propagation of sound waves by the fog-horn commences, simultaneously with the radiation of electric waves from antenna X—E. When the power whistle is operated by steam, the supply may be through the pipe V from a boiler U which may be located at any suitable place and used also either to supply the vessel-propelling means or power apparatus for stevedore use, etc. Other forms of power may be employed to operate the whistle, and the rope P may be attached so that when it is pulled the power operates the whistle, the power being automatically shut off when rope P is released. In the example shown, the rope is so connected that when it is pulled it depresses the lever 20 to open a steam valve in the usual way, and also puts spring 21 under tension so that the steam supply is cut off as soon as rope P is released.

Let the drawings now represent an installation on another ship within audible distance from the siren or whistle of the first, the two vessels and their signal lights being invisible, the one to the other, by reason of fog, storm or darkness. Under these circumstances pilot number 2 will have the telephone T at his ear. The suitable spring S, bearing on the switch-member O, keeps the switch in its normal position to maintain the wireless receiving apparatus in operative condition, as shown by the switch-blades 13, 14 and 15 in full lines. Thus the switch-points 1 and 2 are disconnected (as indicated by the dotted line joining them), the switch conductor 16 being in its

normal position to connect switch-points 3 and 4 together to maintain the continuity of the earthed circuit X—E. Also switch blade 13 connects points 1 and 5 together and blade 14 connects points 2 and 6 together; thus connecting to the antenna circuit, the oscillation receiving circuit including condenser C, detector Z and inductance M. The switch blade 15 connects points 9 and 10 together also, so that the circuit is closed through the detector Z, battery Y and telephone T. The small switch D in the battery circuit, (which may be opened in clear weather or when the pilot is not using the system at all) is also closed, so that the receiving apparatus is in operative condition.

Pilot number 2 will therefore not only hear, with his uncovered ear, the sound of the siren on the first boat, but also, with the ear to which telephone T is applied, the signal corresponding to the electrical disturbance on the first ship. And this latter sound will be loud, since the two boats are at most but a few miles or less apart.

If the perception by pilot number 2 of the sound of the whistle, immediately follows the telephone click he will know that immediate action is necessary, even if the sound of the whistle is faint or indistinct; because the close occurrence of the two sounds means that the two boats are dangerously close together, as indicated by the fact that the time required for the transmission of the sound-waves is practically but little longer than that required for transmission of the electric waves. Pilot number 2 will also pull his own compound signaling rope to impart similar intelligence to pilot number 1; and as soon as pilot number 2 lets go of the rope, the switching mechanism will automatically replace his apparatus in condition for receiving. Meanwhile, pilot number 1 has been alternately pulling his signaling rope, and listening for the time intervals between the two signals made by pilot number 2. In this way both pilots will be certainly apprised of immediate danger, which would be impossible with a whistle alone, or with wireless telegraphy alone; and without both operating simultaneously. The rope P, may, particularly on light-house installations, be replaced by any other suitable operating means, such as the automatic or other clock-work arrangements heretofore in use for operating whistles and sirens on ships and light-houses.

On the other hand, if the sound of the whistle is very loud and clear, the boats might be a safe distance of several miles apart, such as not to necessarily cause alarm, delay or loss of steerage-way. In the absence however, of the coöperation of the electric waves with the electric waves, the



pilot could not know this; but if the loud sound of the whistle is heard by him only upon the lapse of a considerable time interval after the telephone click, he is thereby informed of that, to him, interesting fact that the other vessel is at a safely remote distance. Furthermore he has a continual feeling of assurance, in that he and the other pilot may each alternately send and listen, until the time interval very greatly increases between the perception of the telephone click and the whistle sound, respectively, in cases where it does not decrease to such an extent as to necessitate quick action on the part of both pilots in managing their boats.

The whistle W may be replaced by any suitable equivalent, such as a bell, or a gun or other explosion means. And the sound-waves may be propagated through water instead of air, as in the case of the submarine bell signaling system, wherein the sound is telephonically received on ship-board. The submarine sound-transmitting bell may not only be located at a station, but may be carried as a part of the ship installation. In such cases the telephone receiver of the submarine bell system will, in accordance with this invention, be applied to the ear of the pilot to which telephone T is not applied.

Obviously, and particularly in the case of installations at light-houses or light-ships, certain installations employing this invention may transmit a characteristic signal, so as to inform the pilot or pilot number 2 of his proximity to a definite locality.

While the invention is useful as applied to ocean-going vessels, it is particularly adapted to decrease danger in connection with light-houses, light-ships, and coasting vessels, including tugs and small steamers which frequent rivers, harbors and the coast generally. The practicability of wireless telegraphy now being assured, the invention is obviously practical, and its utility is also apparent.

I claim:

1. Apparatus for a signaling installation which comprises means for transmitting electric waves; in combination with means for observing the receipt of such waves from a distant transmitter; of a switch for causing said transmitting and receiving means to be alternately operative and inoperative; means for causing said switch to normally maintain the receiving means operative; means for producing sound waves transmissible to a considerable distance; and means for independently but simultaneously operating said sound-producing means and the switch to cause the electric wave transmitting means to become operative.

2. Apparatus for a signaling installation, which comprises means for transmitting

electric waves; in combination with means for observing the receipt of such waves from a distant transmitter; of a switch for alternately operating such transmitting and receiving means; a spring which normally closes the switch with the receiving means; a power whistle; and means for independently but simultaneously operating said whistle and closing the switch to operate the electric transmitting means.

3. In apparatus for a composite signaling installation, the combination with means for transmitting and intelligibly receiving electric waves; of means for producing sound-waves transmissible to a considerable distance; means for placing alternately in operative condition, the means for transmitting and the means for receiving the electric waves; and means for operating the sound-producing means independently of but simultaneously with the electric wave transmitting means.

4. Apparatus for a signaling installation which comprises means for transmitting electric waves; in combination with means for observing the receipt of such waves from a distant transmitter; an aerial system constituting a part common to said transmitting and receiving means; of a switch for alternately operatively connecting one of said means with the aerial system and simultaneously removing the other means from such connection while maintaining an operative circuit through the aerial system; means for producing sound waves transmissible to a considerable distance; and means for independently but simultaneously operating said switch and said sound-producing means.

5. In a composite signaling installation, the combination with a transmitter of electric waves, of means for observing the receipt of such waves from a distant electric wave transmitter, means, operatively independent of said observing means, for producing sound waves transmissible to a considerable distance; and means alternately placing in operative condition, the electric wave transmitter and the means for observing the receipt of the electric waves.

6. In a composite signaling installation, the combination with means for transmitting and means for intelligibly receiving electric waves; of means, operatively independent of said receiving means, for producing sound-waves transmissible to a considerable distance; means for rendering the receiving means inoperative during the operation of the sound-producing means, and means for operating said electric wave transmitting means and said sound-producing means substantially simultaneously.

7. In a composite signaling installation, the combination with means for transmitting and means for intelligibly receiving electric waves; of means for alternately

placing in operative condition, the means for transmitting and the means for receiving electric waves; means, operatively independent of said receiving means, for producing sound-waves transmissible to a considerable distance; and means for operating the sound-producing means and the electric wave transmitting means substantially simultaneously.

WARREN N. PHINNEY.

Witnesses:

PHILIP FARNSWORTH,  
M. D. HART.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

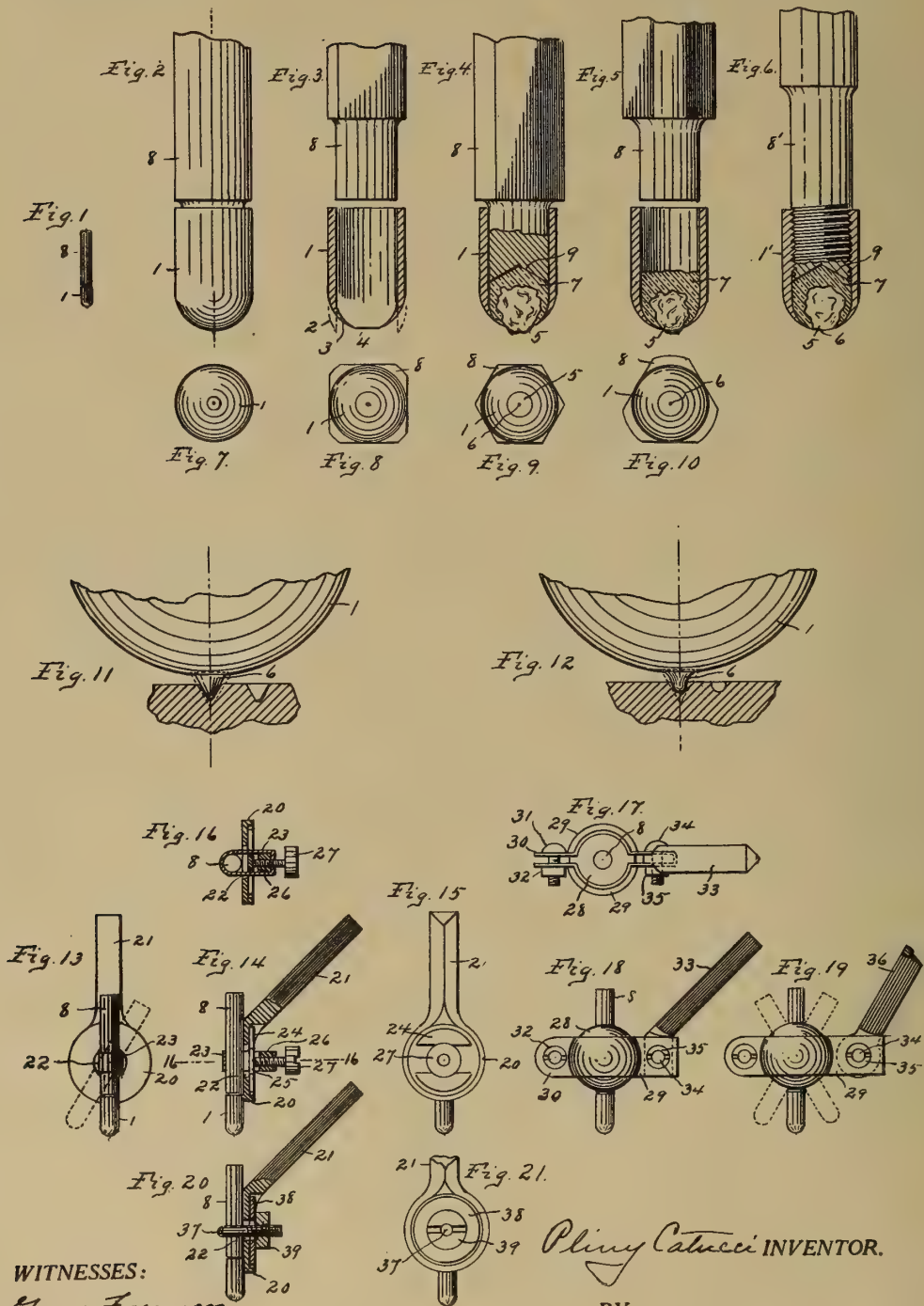
STYLUS FOR SOUND REPRODUCING MACHINES,  
# 1,138,354-----P. Catucci,  
Patented-May 4, 1915.  
Filed- August 10, 1914.



P. CATUCCI.  
 STYLUS FOR SOUND REPRODUCING MACHINES.  
 APPLICATION FILED AUG. 10, 1914.

1,138,354.

Patented May 4, 1915.



WITNESSES:

Chas. Freeman  
 J. L. Green.

Pliny Catucci INVENTOR.

BY

Louis M. Sanders ATTORNEY

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

STYLUS FOR SOUND-REPRODUCING MACHINES.

1,138,354.

Specification of Letters Patent.

Patented May 4, 1915.

Application filed August 10, 1914. Serial No. 855,946.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented a certain new and useful Improvement in Styli for Sound-Reproducing Machines, of which the following is a description.

My invention relates to improvements in the mounting of the jeweled stylus points for sound reproducing machines, and has for its object the utilization of diamonds, sapphires, and other precious stones in the rough for reproducing points of sound boxes. In one of the well known forms of styli, the point is constructed of a diamond or a sapphire which is usually of minute cylindrical or prismatic shape having upon one end thereof a perfectly polished point, which when properly mounted is used to follow the record groove of a phonograph tablet. The cutting and grinding of these hard jeweled points is a slow and expensive process inasmuch as the point itself is almost microscopic in size, and in practice the operator is required to use high powered glasses in order to accomplish the perfect grinding of the point. Moreover, in order to secure stylus points of the requisite size, it is the practice to take the precious stones, either diamond or sapphire, and saw them up into comparatively long prismatic strips which are afterward rounded and pointed. For this purpose, diamonds and sapphires of considerable size and value are required. I have discovered that it is not only possible, but practicable, to use small diamond or sapphire chips in the rough mounted in a suitable holder and having a working point ground thereon. The process of grinding the working point upon the stone results in locating the axis of such working point exactly in the axis of the holder and its shank so that the general direction and location of the point when the stylus is put in use is not left to guess work.

My improvement further relates to a holder for the stylus needle, constructed substantially as above indicated, such holder being provided with means whereby the point of the needle may be made to bear upon the record surface at any requisite or desired angle for the proper reproduction of the record. This holder is provided with a shank by which it may be supported in

the stylus lever of the sound box with which it is to be used.

It might be considered that the process of grinding the working point upon the rough diamond or sapphire would be an expensive one, and that the cost of the diamonds or sapphires themselves would be prohibitive. This, however, is not the case, for the small diamond chips and minute rough diamonds and sapphires can be had for a very small price, and the roughness of their surface adds materially to the firmness of the mounting in the holder.

In the accompanying drawings forming a part of my improvement Figure 1, illustrates a side view of one form of my improved stylus drawn to full size for actual use. Fig. 2, is a similar view very much enlarged. Fig. 3, illustrates the cup holder and the shank thereof detached. In this case, the shank is shown square with round corners. Fig. 4, illustrates, partly in vertical section, a hexagonal shank with the cup holder and cementitious material. Fig. 5, illustrates a triangular shank with rounded corners about to be inserted in a cup holder, in which the rough stone is held in position by the cementitious material. Fig. 6, is a similar view partly in section of a stylus having a wooden shank screwed into the cup holder and holding the cementitious material and working point in position. Fig. 7, is a bottom plan view of Fig. 2. Fig. 8, is a similar bottom plan view of Fig. 3. Fig. 9, is a similar bottom plan view of Fig. 4. Fig. 10, is a similar bottom plan view of Fig. 5. Fig. 11, is a very much enlarged view of a finished stylus point designed for use in connection with a record groove which is V-shaped in cross-section. Fig. 12, is a similar enlarged view of a stylus point designed for use in connection with a record groove which is substantially semi-circular in cross-section. Fig. 13, is an enlarged front view of a stylus holder designed for securing the stylus to the sound box lever. Fig. 14, is a side elevation partly in section of said stylus holder. Fig. 15, is a rear view of the same. Fig. 16, is a cross-section on line 16—16 of Fig. 14. Fig. 17, is a plan view. Fig. 18, is a side elevation of a modified form of stylus holder designed for permitting the universal adjustment of the stylus point. Fig. 19, is a side elevation of a still further modified form showing the



securing shank adjustable. Fig. 20, is a side elevation partly in section, and Fig. 21, is a rear elevation of a still further modified form of stylus holder.

5 In practice, as above indicated, the complete stylus is of a size as indicated in Fig. 1. In this case the working point is so minute as hardly to be discernible to the naked eye. For this reason I have shown  
10 the drawings very much enlarged in order to convey a full knowledge of the method of operation in the manufacture of such points.

In practice I provide a substantially tubular thimble 1, of proper size with its lower edge 2, at first rounded off as indicated in Fig. 3. This thimble is mounted in suitable mechanism and the rounded lower edge is spun down into the shape shown in full lines in Fig. 3, at 3, leaving an opening 4, of comparatively considerable size. The rough diamond or sapphire chip 5, is next dropped into this thimble-shaped holder 1, after which a few minute particles of spelter 7, or other suitable cementitious material with low melting point, is dropped into the cup, which then with its contents is held in a minute gas flame until the spelter or other cementitious material has been melted.  
30 The shank 8, is then forced down upon the spelter or other cementitious material, and held for a moment or two while the spelter or cementitious material is allowed to harden. The lower end of the shank 8, is provided with a conical cavity 9, so that when the shank is forced into the cup-shaped thimble 1, it has a tendency to crowd and force the melted spelter into the interstices and irregularities of the stone so that  
40 it is firmly embedded in solid metal. With the parts thus brazed and secured together the stylus is then inserted into a grinding device and the working point 6, is ground upon the stone or jewel 5, and at the same time any surplus cementitious material is ground away so as to leave the end of the stylus substantially hemi-spherical with the working point 6 in the exact axial line of the stylus. This I regard as an important  
50 feature, for as above indicated the completed point is so minute in its dimensions that it is almost impossible to discern it with the naked eye, and the fact that its location is in the exact axis of the stylus serves to indicate to the user that the general direction of the stylus itself may be relied upon to properly locate the working point upon the record with which the stylus is to be used.

60 In some cases, as indicated in Fig. 6, I may provide a shank 8', made of wood and screw the same into a previously screw-threaded cup holder 1' as indicated. For the reproduction of a certain class of music,  
65 it has been found that the elasticity of a

wooden shank is such as to render the reproduction much more perfect. Again, the manufacturers of sound reproducing machines have adopted various forms for the shanks of their styli. For example, one kind  
70 of instrument uses only a cylindrical stylus, as in Fig. 7, with a diamond point and a hexagonal stylus as shown in Fig. 9, for a sapphire point. Another manufacturer uses a square shank as shown in Figs. 3 and  
75 8, for the diamond point, and a triangular shank as shown in Figs. 5 and 10, for a sapphire point. The working points are so minute that the material of which they are constructed is hardly to be discerned by the  
80 naked eye, therefore the shape of the shank itself is utilized in my improved stylus for determining the character of the working point itself,—that is as to whether it is designed for a record groove triangular in  
85 cross-section, or whether the material of which the working point is constructed is diamond or sapphire. As shown in the enlarged views in Figs. 11 and 12, it will be noted that the projecting working point of  
90 the stylus is always constructed to conform quite closely in vertical section to an equilateral triangle, with the extreme apex of the working point slightly rounded. In  
95 Fig. 12, it will be seen that the working point is hemi-spherical, but that the shank of the point is rounded up to run into the body of the stone where it is held by the cementitious material within the holder 1. When it is considered that the maximum  
100 depth of a record groove is about 4/1000ths of an inch, and the amount to which the working point of the stylus projects from the holder is about 7/1000ths of an inch, the minuteness and delicacy of the operation  
105 will be realized. In practice the jeweled pointed stylus appears to work best when the axis of the stylus itself is substantially perpendicular to the plane of the record. Under certain conditions, however, a slightly  
110 better reproduction may be had by varying the angle slightly from the perpendicular. For this reason I have provided a holder for the stylus whereby the bearing angle for the stylus itself upon the record  
115 tablet may be adjusted to suit the conditions required.

In Figs. 13, 14, 15 and 16, I have shown one form in which the stylus is mounted upon a circular cup-shaped disk 20, provided  
120 with a shank 21, which projects at an angle from the face of the disk 20. The disk 20, is provided with a central aperture 22, through which projects the shackle 23. On the cup side of the disk 20, I provide the I-shaped  
125 flat clamping member 24, the narrow central portion of which 25, passes through the opening in the shackle 23. Within the shackle is a screw-threaded nut 26, through which extends the screw 27, the inner end  
130



bearing upon the part 25 of the member 24. The free end of the shackle projects through the aperture 22, to receive the stylus shank 8. From this it will be readily understood that by screwing up the screw 27, the shank of the stylus may be adjusted to any angular position relatively to the disk 20.

In Figs. 17 and 18, I show the stylus shank 8, as being provided with a spherical body 28, which is clamped between two hemispherical socket members 29, of the shape and contour illustrated in Fig. 17. The members 29 are provided with projecting lugs 30, and with the clamping screw 31, and nut 32. The supporting shank 33, is clamped between the opposite ends of the clamping members 29, by means of a similar screw 34 and nut 35. It will be readily seen that with this construction a substantially universal joint is provided by which the shank 8 may be adjusted to any degree of angularity within the limits of the clamping members 29.

In Fig. 19, I show a similar method of adjustment but provide also for the adjustment of the angularity of the shank 36. In this case, the shank 36 projects between the free ends of the members 29, and is held in adjusted position by means of the screw 34 and its nut 35.

In Figs. 20 and 21, I have shown a slight modification of the first form of stylus holder; in this case, the cup-shaped disk 20 and its shank 21, are substantially the same as indicated in Figs. 13 to 16 inclusive. However, instead of the shackle 23, I provide a screw-eye 37, the eye portion of which is slightly larger than the diameter of the shank 8, of the stylus. On the cup side of the disk 20, I provide a washer 38, outside of which, upon the screw-threaded end of the screw-eye 37, is the nut 39. The aperture 22, through the disk is of sufficient size to permit of the turning of the screw-eye without interfering with the walls of said aperture.

In any one of the stylus holders shown, the means for securing the shank of the stylus may be shaped to conform to the contour of the shank itself whether the same be circular, square, hexagonal, or triangular in cross-section as indicated in Figs. 7, 8, 9 and 10, in a manner readily understood by those skilled in the art. In the stylus holders it will be noted that I have shown the shanks 21, 33 and 36 as being triangular in cross-section. These angular shanks, taken in connection with the angularity of the disk 20, and the clamping members 29, readily afford a convenient means for determining the exact position for mounting the stylus holder in the stylus lever of the sound box, and thereby avoid all guess work in the adjustment of said holder in the stylus lever, and the fact that

the axis of the working point lies in the axis of the stylus relieves the user of the necessity of first locating the microscopic working point.

While I have shown several modifications of stylus holder, I do not desire to be considered as exhausting this particular feature of my invention, for it is readily seen that now the suggestion of adjustability has been made, other forms of adjustment will readily suggest themselves to those skilled in the art.

I claim:

1. In a stylus mounting for sound reproducing machines, the combination of a tubular thimble having one of its ends contracted to form a small opening, a rough jewel embedded in a cementitious material within said thimble, resting against the ledge formed by and projecting slightly from said contracted opening, and a working point ground upon said jewel, said working point lying in the axis of said thimble.

2. In a stylus mounting for sound reproducing machines, the combination of a tubular thimble having one of its ends contracted to provide a comparatively small opening therein, a rough jewel embedded in a cementitious material within said tubular thimble, resting against the ledge formed by and projecting slightly from said opening, and a working point upon the projecting part of said jewel with the axis of said point coincident with the axis of said thimble.

3. In a stylus mounting for sound reproducing machines, the combination of a tubular thimble having one of its ends contracted to form a small opening, a rough jewel embedded in a cementitious material within said tubular thimble for holding said jewel in place, a working point ground upon said jewel in the axis of said thimble, and a shank inserted into said tubular thimble above and against said cementitious material.

4. In a stylus mounting for sound reproducing machines, the combination of a tubular thimble having one of its ends contracted to provide a comparatively small opening therein, a rough jewel projecting slightly from said opening, a cementitious material within said tubular thimble in which said jewel is embedded for holding the same against displacement, a working point ground upon the projecting part of said jewel coincident with the axis of said thimble, and a shank inserted into said tubular thimble above and against said cementitious material.

5. A stylus for sound reproducing devices having a rough jewel having a hemispherical surface provided with a single stylus point ground thereon, said stylus point having an axial-section conforming to the sides of an equilateral triangle.

6. In a stylus mounting for sound repro-

- ducing devices, the combination of a rough stone having a single working point ground thereon, said point conforming in vertical-section to the sides of an equilateral triangle,
- 5 a support for said jewel comprising a tubular thimble having a contracted opening at one of its ends against the margin of which said jewel rests, and a shank firmly inserted in its opposite end.
- 10 7. In a stylus mounting for sound reproducing devices, the combination of a support comprising a tubular thimble having a contracted opening at one of its ends, a jewel embedded in metal within said thimble
- 15 and resting against the ledge formed by said contracted opening and having a working point projecting from said opening, and a shank firmly inserted in its opposite end, said shank having a cross-sectional contour
- 20 of a shape to indicate the character of the working point and its use.
8. In a stylus mounting for sound reproducing devices, the combination of a stylus having a jewel working point in the axis
- 25 thereof, and an adjustable stylus holder for supporting said stylus at any degree of angularity with respect to the face of the record upon which said stylus is to be used.
9. In a stylus support for sound reproducing devices, the combination with the stylus,
- 30 of a prismatic shank, and a connection between said shank and said stylus whereby said stylus may be supported by said shank at any angle with respect thereto.
- 35 10. In a stylus support for sound reproducing devices, the combination with the stylus, of a support for said stylus, and means for adjustably securing said stylus to said support at any angle with respect to
- 40 said support.
11. In a stylus support for sound reproducing devices, the combination with the stylus, of a supporting disk, and means for
- adjustably connecting said stylus to said disk at any radial angle with respect to the face 45 of said disk.
12. In a stylus support for sound reproducing devices, the combination with the stylus, of a disk, and means for connecting said stylus to the face of said disk in any 50 radial position with respect to the center thereof.
13. In a stylus support for sound reproducing devices, the combination with the stylus, of a supporting disk, means for securing said stylus to one face of said disk in 55 different radial positions with respect to the center of said disk comprising a shackle surrounding said stylus and projecting through the center of said disk, and means for securing said shackle to the opposite face of said disk.
14. In a stylus support for sound reproducing devices, the combination with the stylus, of a centrally apertured disk having 65 an angular shank connected therewith, means for securing said stylus to one face of said disk comprising a shackle surrounding said stylus and projecting through the aperture in said disk, and means bearing upon the opposite face of said disk for securing said 70 shackle and stylus in adjusted positions relatively to the face of said disk.
15. In a stylus support for sound reproducing devices, the combination with the 75 stylus, of a supporting shank, and means connecting said shank and said stylus for permitting minute angular adjustments of said stylus with respect to said shank.
- In testimony whereof, I have hereunto set 80 my hand this 8th day of August, 1914.

PLINY CATUCCI.

In presence of—

LOUIS M. SANDERS,  
F. L. GREEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



STYLUS POSITIONING AND CIRCUIT CONTROLLING MEANS FOR SOUND  
REPRODUCING MACHINES,

# 1,138,646-----C. W. Ebeling,  
Patented-May 11, 1915.  
Filed-October 30, 1913.



C. W. EBELING.

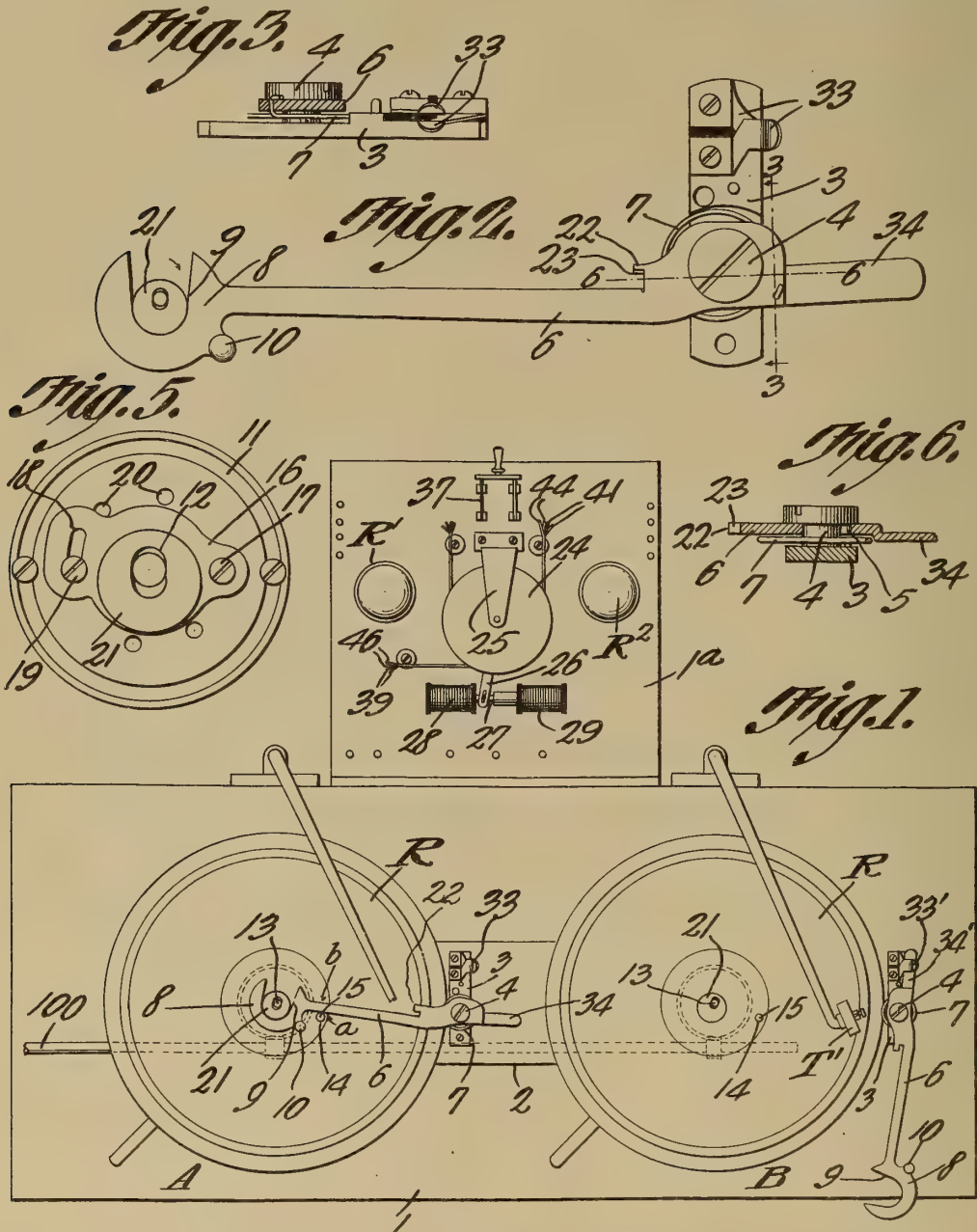
STYLUS POSITIONING AND CIRCUIT CONTROLLING MEANS FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED OCT. 30, 1913.

1,138,646.

Patented May 11, 1915.

3 SHEETS—SHEET 1.



Witnesses

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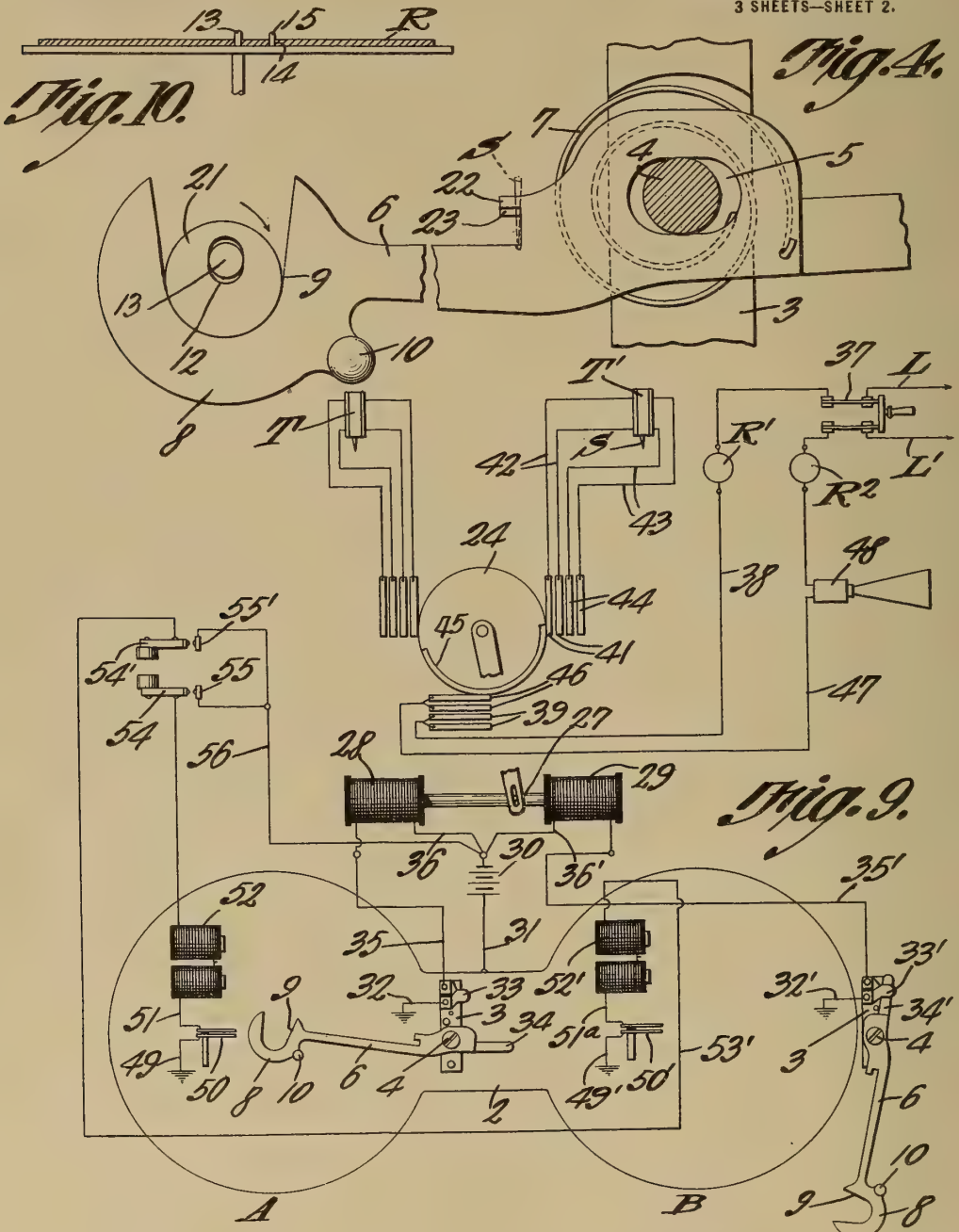
STYLUS POSITIONING AND CIRCUIT CONTROLLING MEANS FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED OCT. 30, 1913.

1,138,646.

Patented May 11, 1915.

3 SHEETS—SHEET 2.



Witnesses

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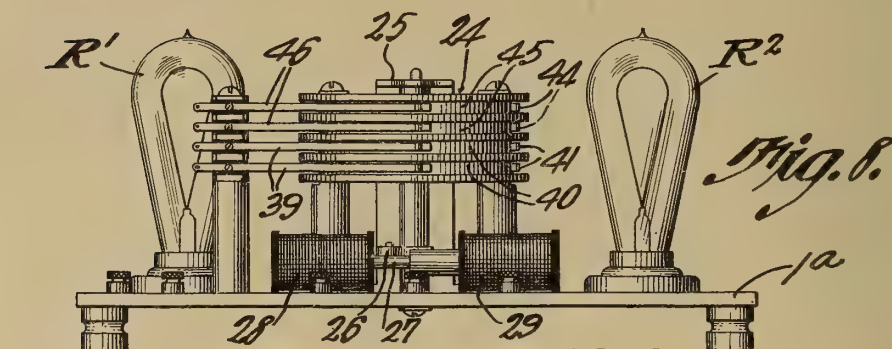
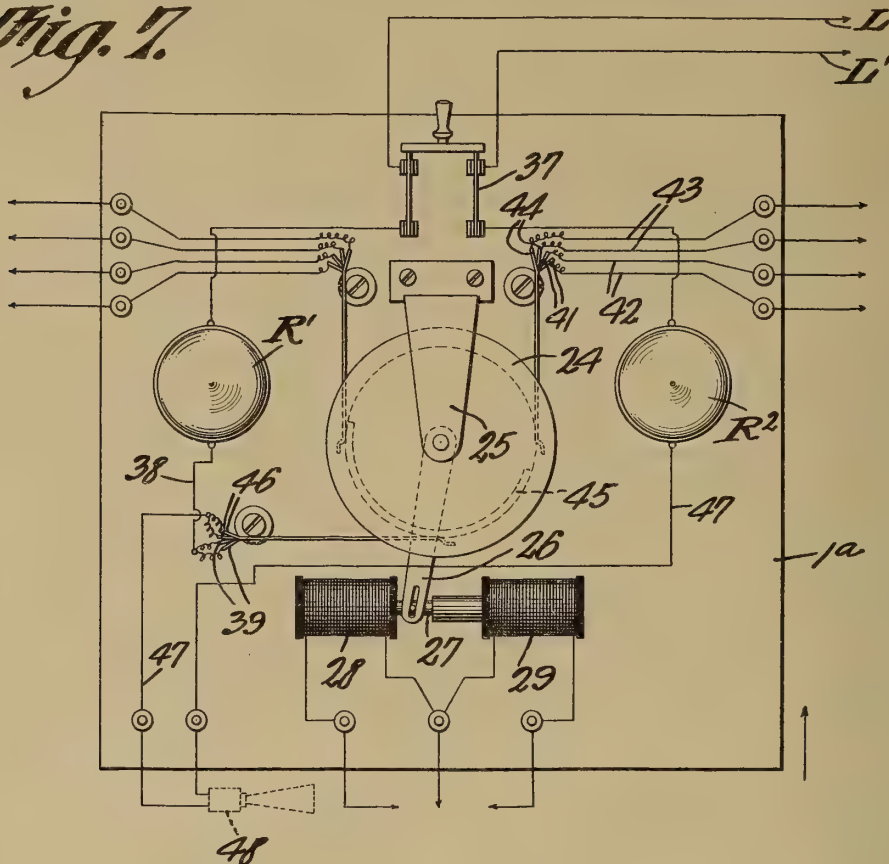
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 APPLICATION FILED OCT. 30, 1913.

1,138,646.

Patented May 11, 1915.

3 SHEETS—SHEET 3.

*Fig. 7.*



Witnesses

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# UNITED STATES PATENT OFFICE.

CHARLES W. EBELING, OF WHEELING, WEST VIRGINIA.

STYLUS-POSITIONING AND CIRCUIT-CONTROLLING MEANS FOR SOUND-REPRODUCING MACHINES.

1,138,646.

Specification of Letters Patent.

Patented May 11, 1915.

Application filed October 30, 1913. Serial No. 798,296.

*To all whom it may concern:*

Be it known that I, CHARLES W. EBELING, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Stylus-Positioning and Circuit-Controlling Means for Sound-Reproducing Machines, of which the following is a specification.

10 The present invention relates to improvements in a stylus positioning and circuit controlling means for sound reproducing machines, one object of the present invention being the provision of means, which will properly guide the stylus to the phonic groove of the record at the initial rotation of the sound record carrier, said means being automatically released and moved out of the path of the stylus and from above the record to simultaneously close an electric circuit for electrically connecting a telephonic transmission means including the reproducer of the sound reproducing machine.

25 The present invention is especially applicable to sound reproducing machines used in connection with motion picture projectors, and more particularly to the structure set forth in my co-pending application filed even date herewith Serial No. 798,295 and also the main invention as shown in the application for patent of Harrison W. Rogers, filed February 7, 1913, Serial No. 746,890, the present mechanism being the result of experimenting with the mechanisms set forth in the above two applications, it being necessary only in the present instance to attach a device at the center of the record in combination with a pivoted arm capable of a slight sliding movement adjacent the record, the arm and the means carried by the record cooperating to move the stylus toward the beginning of the phonic groove during the initial starting of the record and to release the stylus guiding arm at such point so that it is automatically swung out of the path of the record and from thereabove to automatically close the circuit to the telephonic transmission device of the sound reproducing machine.

50 With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that

changes in the precise embodiment herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a top plan view of the complete mechanism for guiding the stylus and controlling the circuit. Fig. 2 is a top plan view on an enlarged scale of the stylus controlling and guiding arm. Fig. 3 is a section taken on line 3—3 of Fig. 2. Fig. 4 is a view similar to Fig. 2 on an enlarged scale with the pin head removed to show the elongated slot to permit the longitudinal movement of the stylus guiding arm. Fig. 5 is a top plan view of the record carried means for actuating and releasing the arm. Fig. 6 is a section taken on line 6—6 of Fig. 2. Fig. 7 is an enlarged top plan view of the selecting switch for the talking circuit and the solenoid for actuating the same. Fig. 8 is a front elevation thereof looking in the direction of the arrow Fig. 7. Fig. 9 is a diagrammatic view of the electrical circuit used in connection with the present invention and including the electrical circuit controlled by a moving film in a projector. Fig. 10 is a sectional view of a record disk upon its carrier illustrating the method of insuring the proper positioning thereof upon the carrier and also its positive rotation with the carrier.

Referring to the drawings, the numeral 1 designates a table or support, upon which is mounted the casing 2 carrying the sound reproducing mechanisms A and B, two in the present instance being shown and adapted to be operated by means of the driving shaft 100, which may be driven by a motor or from the projector mechanism (not shown) of a motion picture machine.

Adjacent to each mechanism A or B, is secured a plate 3, which by means of the pin or screw 4 forms a pivot through the instrumentality of the elongated slot 5 for the stylus guiding and controlling arm 6. This arm 6 as clearly shown, is adapted to be normally held in the position shown in connection with the machine B by means of the spring 7, while the headed end 8 is provided with the peculiar shaped recess 9 and with the operating knob or handle 10, by means of which the arm 6 may be manually moved from the position shown in connection with the machine B to the position as shown in connection with the machine A.



Adapted to be used in connection with the arm 6, and carried by the disk record R, centrally thereof, is a metal plate 11 having the central aperture 12 adapted to aline with the central aperture of the record, and receive the reduced upper end 13 of the centering pin of the record carrier. The record R is further provided with an aperture 14 adapted to fit upon a second pin 15 also carried by the record carrier, said pin 15 cooperating with the pin 13 to hold the record R against independent rotation of the carrier and at the same time constitute a means for assisting when the record R has moved one full revolution from the position shown at the machine A Fig. 1 to engage the opposite side *b* of the arm 6 to free the same from the cam or eccentric 21 which is carried by the plate 16, and the detailed construction of which will presently appear. In assembling the record for use, the pin 13 enters the aperture 12 of the disk 11 while the pin 15 enters the aperture 14 of the record R, the arm 6 being assembled so that the recess 9 embraces the cam 21, the pin engaging the arm 6 at the point *a* when the record is ready to be started. It is therefore evident, that when the record rotates and the pin 15 is brought to engage the arm 6 at contact *b*, that the rotating carrier will have a tendency to move the arm 6 away from the engagement with the cam 21, and thus free it to the action of the spring 7 which quickly snaps the same to assume the position shown in connection with the machine B, Fig. 1.

The eccentric or cam 21 is carried by the plate 16, which by means of the screw 17, the elongated slot 18 and the screw 19 in connection with several of the apertures 20 of the disk 11 is properly adjusted to impart as the record R is rotated, the desired longitudinal movement to the arm 6 so that the stylus S resting upon the inclined face 23 of the lug 22 of the arm 6 adjacent the pivoting point thereof, will be moved inwardly toward the beginning of the phonic groove of the rotating record R and by the time that the pin 15 engages point *b* of the arm 6, be placed in such groove and consequently be out of the position to be engaged by the projection 22 as the arm 6 is released from the cam 21 and is thrown by its spring 7 to the position as shown in connection with the machine B.

When the parts are assembled as in the position shown in Fig. 1, machine A, the eccentric 21 has a peculiar pulling action upon the head 8, so as to slightly hold the arm 6 against the tension of the spring 7, such tension being increased, as the record R is rotated and the cam 21 is moved to pull inwardly upon the arm 6 to place the stylus S in the phonic groove, the pin 15 at the desired point and approximately after the record has made a full rotation, engaging the

arm as before stated at contact *b* and thus disengaging it from the cam 21 so that the arm 6 may be moved entirely from over the record and throw its circuit closing arm 34 between the insulated switch members 33 to close a circuit, the purpose of which will presently appear.

Where the present device is used in connection with an electrical telephonic means for transmitting from the record R, a single transmitter is employed with each record, there in the present instance being two transmitters T'—T', and as it is desirable to maintain the circuit to the respective transmitters open until the stylus S has been positioned within the beginning of the phonic groove of the record R, the switch composed of the members 33 and 34 is provided for actuating means for operating a rotary or oscillatory switch 24. This switch 24 is composed of a cylinder or spool of insulation mounted in the bracket 25 upon the base 1<sup>a</sup>, an arm 26 being connected to the axis thereof to be operated by means of the solenoid controlled rod 27 which is oscillated at the proper time by means of the respective solenoids 28 and 29 mounted upon the base 1<sup>a</sup>.

The circuits controlled by the respective switches 33—34 of machine A and 33'—34' of the machine B, are clearly shown in diagram in Fig. 9. The circuit controlled by the switches 33—34, includes the battery 30, the conductor 31, the metal casing 2, the conductor 32, one of the contacts 33, the switch 34, the other contact 33, the conductor 35, the solenoid 28, and the conductor 36. Thus when the solenoid 28 is energized, the switch 24 is oscillated to assume the position as shown in the diagram to place in circuit the transmitter T of machine A.

The circuit controlled by the switch 33'—34' includes the battery 30, the conductor 31, the casing 2, the conductor 32', the switch 33'—34', the conductor 35', the solenoid 29 and the conductor 36'. Thus when the switch of the machine B is closed, the solenoid 29 oscillates the oscillatory switch 24, and thus connects the transmitter T' of the machine B in circuit.

In order to fully set forth the telephonic circuit, the circuit to the transmitter T' will we described, and includes the two line wires L—L' which feed direct current through the switch 37 to the conductor 38, the two supported metal contacts 39, which are in engagement with the segmental metal plates 40 of the switch 24, which when the switch 24 is in the position as shown in Fig. 9 are in contact with the two metal plates 41, the conductor 42, the transmitter T', the conductors 43, the two upper metal contact plates 44, the two upper metal segmental plates 45 of the switch 24, the two metal contact plates 46, the conductor 47, and the



amplifying receiver 48. It has been found desirable to connect in series with the conductors 38 and 47, resistance lamps R' and R<sup>2</sup>.

5 It will thus be seen that when the switch 33'—34' is thrown to the position as shown in machine B in Fig. 9, the stylus S being properly positioned in the phonic groove, that the switch 24 will be moved to the position as therein shown to thus energize the circuit including the transmitter T, so that the instant the portion of the groove that contains the sound record is engaged by the stylus S, the sound reproduced thereby will be transmitted through the electrical circuit and amplified in the device 48. By this means, the grating of the stylus S upon the rotating record up to a point of the closure of the switches 33—34 and 33'—34' is rendered inaudible and thus the objections to such grating sound is removed, such circuit for the sound reproducing or telephonic means being closed only when the sound reproducing portion of the groove is reached.

In diagram is shown two electromagnets 52—52', which in the co-pending application control the means for selectively connecting either one of the machines A or B to the driving shaft 100, a single battery source as the battery 30 being employed for this purpose and the circuit to each electromagnet being as follows: The battery 30, the conductor 31, the casing 2, the conductor 49, the switch 50, the conductor 51, the electromagnet 52, the pivoted member 54 controlled by the film of the projector and the stationary contact 55, and the conductor 56. This circuit is controlled for connecting machine A, the circuit for controlling machine B being, the battery 30, the conductor 31, the conductor 49', the switch 50', the conductor 51<sup>a</sup>, the electromagnet 52', the conductor 53', the film controlled switch members 54'—55', and the conductor 56. Thus with two sound reproducing machines A and B, the same may be controlled successively to be started and stopped through the instrumentality of the film and as more particularly set forth in detail in the co-pending application mentioned above.

What is claimed is:

1. In a sound reproducing machine, a sound record carrier, a stylus, means for moving the stylus transversely of the phonic groove of a record to direct the stylus to the phonic groove of such record, and means actuated by the record carrier for displacing said stylus moving means after the stylus has been placed in the phonic groove of the record.

2. In a sound reproducing machine a sound record carrier, a stylus, a stylus positioning means movable transversely of the phonic groove of a record supported by said

carrier during the rotation of the carrier to direct the stylus to the phonic groove of such record, and means actuated by the record carrier for displacing said stylus positioning means after the stylus has been guided to the phonic groove of the record.

3. In a sound reproducing machine, a sound record carrier, a stylus, a pivotally displaceable stylus positioning means mounted for movement transversely of the phonic groove of a record supported by said carrier, means actuated by the carrier for imparting transverse movement thereto during the rotation of the carrier, and means actuated by the carrier for displacing the stylus positioning means after the stylus has been directed to the phonic groove of the record.

4. In a sound reproducing machine, a sound record carrier, a stylus positioning means, a circuit closer, and means actuated by the carrier for controlling the stylus positioning means and the circuit closer.

5. In a sound reproducing machine, a sound record carrier, a stylus, a stylus positioning means movable transversely of the phonic groove of the record supported by said carrier during the rotation of the carrier to direct the stylus to the entrance of the phonic groove of such record, means actuated by the record carrier for displacing said stylus positioning means after the stylus has been guided to the phonic groove of the record, and a circuit closer actuated by the stylus guiding means.

6. In a sound reproducing machine, a sound record carrier, a stylus, a pivotally displaceable stylus positioning means mounted for movement transversely of the phonic groove of a record supported by said carrier, means actuated by the carrier for imparting transverse movement thereto during the rotation of the carrier, means actuated by the carrier for displacing the stylus positioning means after the stylus has been directed to the phonic groove of the record, and a circuit closer actuated by the stylus positioning means.

7. The combination with a rotary sound record carrier, an electrical telephonic apparatus including a stylus operated transmitter, and a switch for opening and closing the circuit of said apparatus, of a swingingly mounted arm disposed for movement above the sound record, coöperable means carried in the free end of said arm and by the sound record for imparting a longitudinal movement to the arm during the rotation of the sound record carrier and record, a stylus holding and guiding means carried by the arm for placing the stylus in the phonic groove of the record when the arm is moved inwardly, and means carried by the record carrier for releasing the arm to permit such arm to close the switch.

8. The combination with a rotary sound

record carrier, an electrical telephonic apparatus including a stylus operated transmitter, and a switch for opening and closing the circuit of said apparatus, of a swing-  
 5 ingly mounted arm disposed for movement above the sound record, coöperable means carried in the free end of said arm and by the sound record for imparting a longitudinal movement to the arm during the rota-  
 10 tion of the sound record carrier and record, a stylus holding and guiding means carried by the arm for placing the stylus in the phonic groove of the record when the arm is moved inwardly, a switch closing member  
 15 carried by the arm, and a spring connected to the arm for insuring the closure of the switch when the arm is released from the record.

9. The combination with a rotary sound  
 20 record carrier, two record receiving pins carried thereby, and a stylus actuated transmitter mounted for movement above and in contact with the phonic groove of a record supported by the carrier, of a stylus guid-  
 25 ing means, including a swingingly mounted arm having a hooked free terminal, a cam actuated by the carrier for engagement with the hooked terminal of the arm, whereby as the carrier is rotated, the arm has an in-  
 30 ward and outward longitudinal movement imparted thereto, and means carried by the arm for receiving the stylus of the transmitter and directing the stylus into the phonic groove as longitudinal movement is  
 35 imparted to the arm, the hooked terminal of the arm being freed from the cam when engaged by one of the pins during the rotation of the carrier.

10. The combination with a rotary sound  
 40 record carrier, two record receiving pins carried thereby, and a stylus actuated transmitter mounted for movement above and in contact with the phonic groove of a record supported by the carrier, of a stylus guiding  
 45 means, including a swingingly mounted arm having a hooked free terminal, a cam actuated by the carrier for engagement with the hooked terminal of the arm, whereby as the carrier is rotated, the arm has an inward  
 50 and outward longitudinal movement imparted thereto, means carried by the arm for receiving the stylus of the transmitter and directing the stylus into the phonic groove as longitudinal movement is imparted to  
 55 the arm, the hooked terminal of the arm being freed from the cam when engaged by

one of the pins during the rotation of the carrier, and a spring connected to said arm for throwing the same to one side of the record carrier when released by the pin. 60

11. The combination with a rotary sound record carrier having a central pin, a second pin carried thereby intermediate of the center pin and its periphery, and a trans-  
 65 mitter having a stylus for engagement with the phonic groove of a record supported by the carrier, of means for placing the stylus in the phonic groove of a record, including a plate, a pin carried thereby, an arm pro-  
 70 vided with an elongated slot that fits upon the pin, the free end of said arm being provided with a hook for movement to and from the center of the carrier, and a cam actuated by the carrier for engaging the  
 75 hook, whereby as the carrier is rotated, the cam imparts longitudinal movement to the arm, for placing the stylus in the phonic groove of a record, the second pin of the carrier after the carrier has rotated a prede-  
 80 termined distance, engaging the arm to free its hooked terminal from the cam.

12. The combination with a rotary sound record carrier having a central pin, a second pin carried thereby intermediate of the center pin and its periphery, and a trans-  
 85 mitter having a stylus for engagement with the phonic groove of a record supported by the carrier, of means for placing the stylus in the phonic groove of a record, including a plate, a pin carried thereby, an arm pro-  
 90 vided with an elongated slot that fits upon the pin, the free end of said arm being provided with a hook for movement to and from the center of the carrier, a cam actuated by the carrier for engaging the hook,  
 95 whereby as the carrier is rotated, the cam imparts longitudinal movement to the arm for placing the stylus in the phonic groove of a record, the second pin of the carrier after the carrier has rotated a predeter-  
 100 mined distance engaging the arm to free its hooked terminal from the cam, and a spring for moving the arm from above the record when the arm has been moved from engage-  
 105 ment with the cam.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES W. EBELING.

Witnesses:

SELINA WILLSON,  
 NELLIE HERNDON.



ACOUSTIC INSTRUMENT,

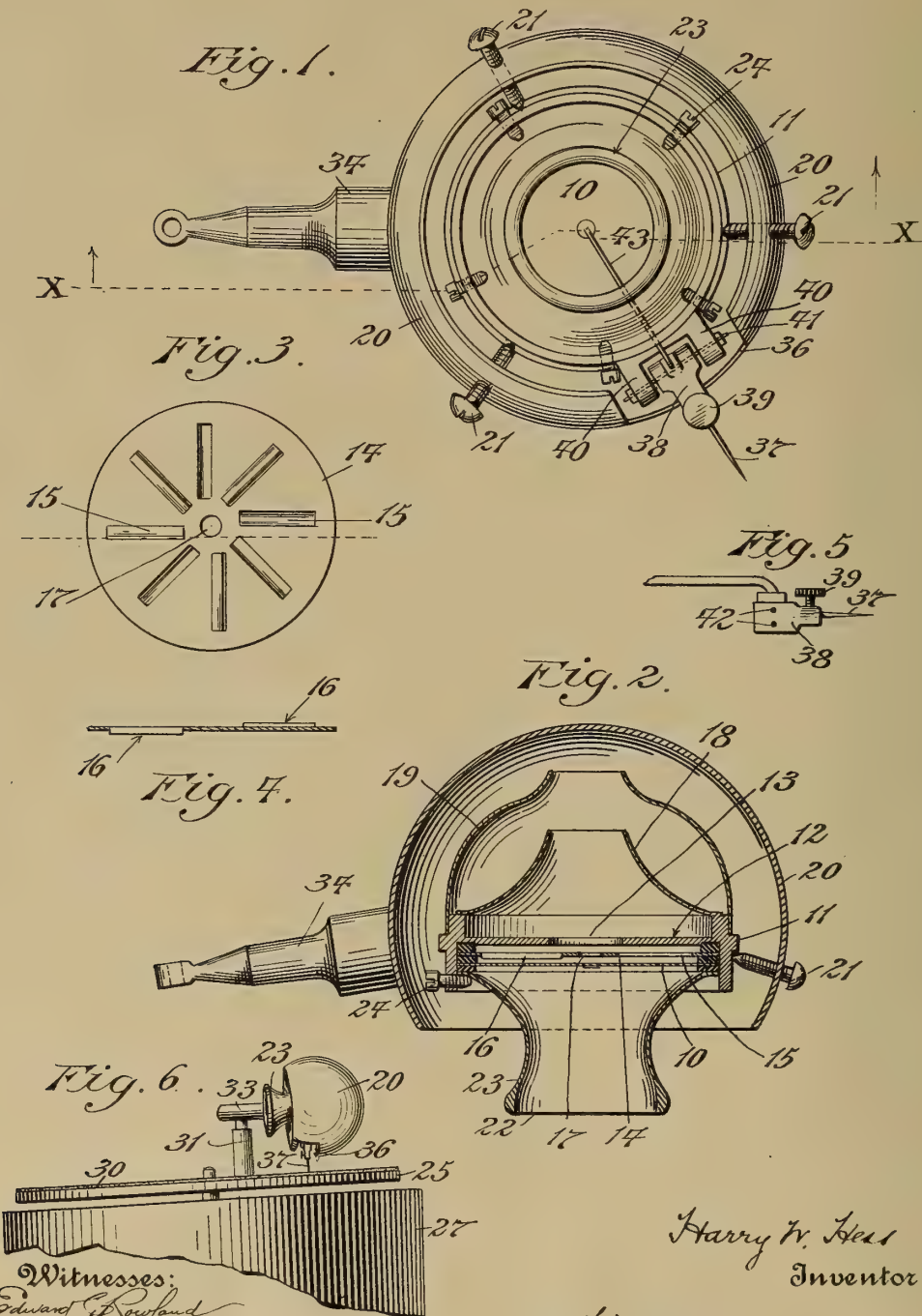
# 1,138,755-----H. W. Hess,

Patented-May 11, 1915.

FILED-December 31, 1913.

1,138,755.

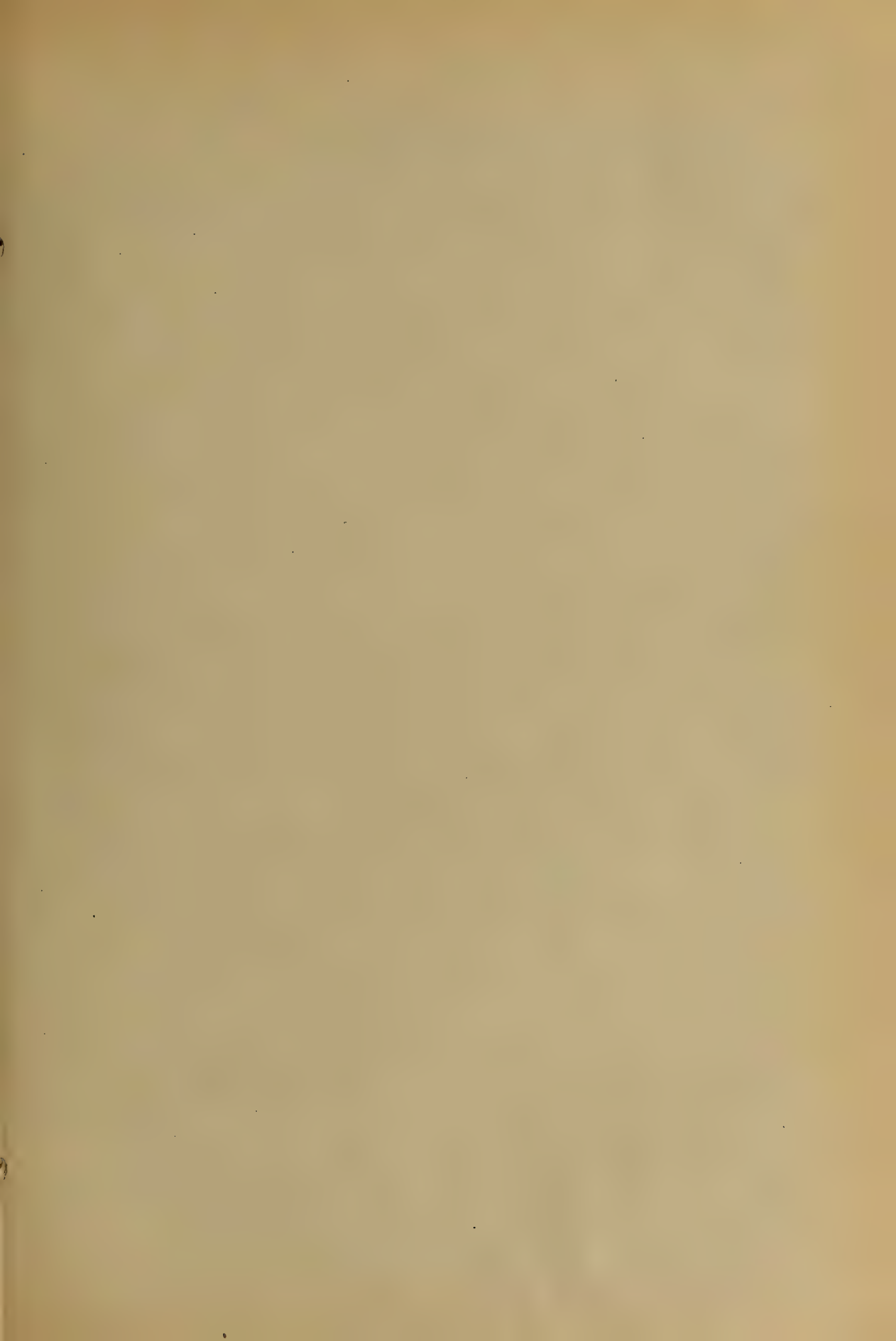
Patented May 11, 1915.  
2 SHEETS—SHEET 1.



Witnesses:  
Edward P. Rowland  
Katharine C. Mead

Harry W. Hess  
Inventor

By his Attorneys  
Wilkinson, Giusti and Mackay

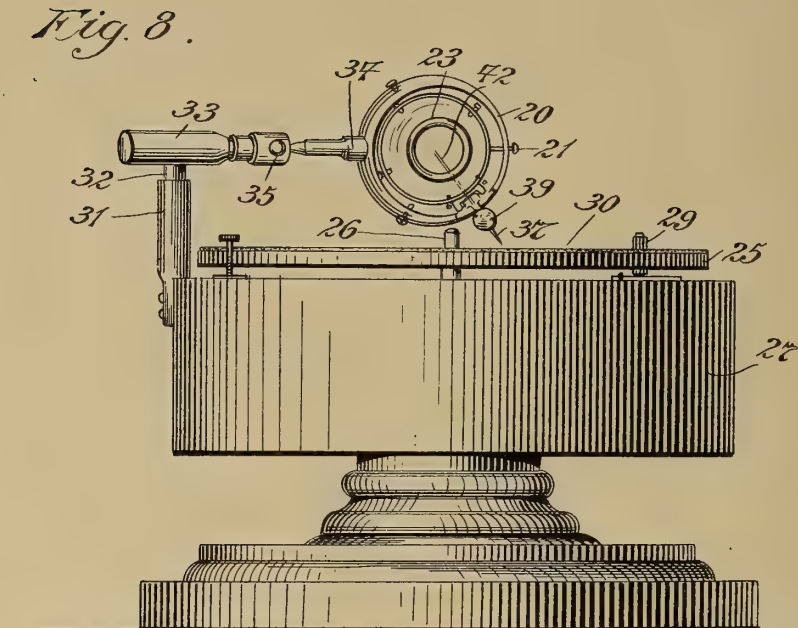
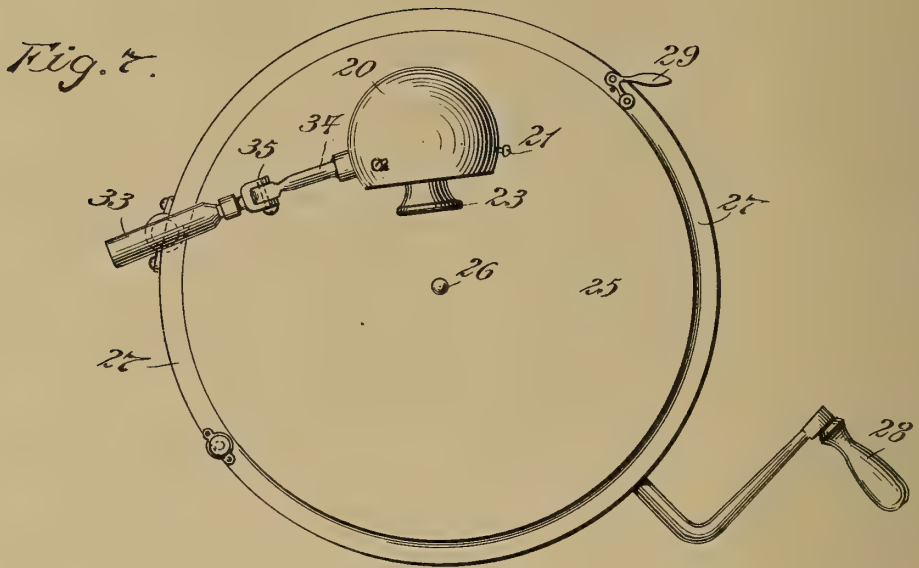




H. W. HESS.  
ACOUSTIC INSTRUMENT.  
APPLICATION FILED DEC. 31, 1913.

1,138,755.

Patented May 11, 1915.  
2 SHEETS—SHEET 2.



Witnesses:  
*Edward Rowland*  
*Katharine C. Mead*

*Harry W. Hess*  
Inventor

*By his Attorneys*  
*Wilkinson, Grist and Mackay*

# UNITED STATES PATENT OFFICE.

HARRY W. HESS, OF NEW YORK, N. Y.

## ACOUSTIC INSTRUMENT.

1,138,755.

Specification of Letters Patent.

Patented May 11, 1915.

Application filed December 31, 1913. Serial No. 809,642.

*To all whom it may concern:*

Be it known that I, HARRY W. HESS, a citizen of the United States, residing at New York, in the State of New York, have  
5 invented certain new and useful Improvements in Acoustic Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in  
10 the art to which it appertains to make and use the same.

The present invention has principal relation to improvements in tone-projecting devices wherein the acoustic vibrations are  
15 produced either mechanically, electrically or otherwise; and, in its particular application of the phonographic art, the invention comprises certain features whereby compactness, lightness and adaptability to various types of these machines are combined  
20 with great accuracy of tone reproduction.

The invention includes, as well, a novel method of blending and reinforcing tone waves.

25 The invention is illustrated in a preferred embodiment in the accompanying drawings, wherein—

Figure 1 is a front elevation of my tone-projecting element as embodied for phonographic purposes, Fig. 2 is a sectional view thereof on the line  $x-x$  in Fig. 1, Fig. 3  
30 is a face view of the tone-clarifier, Fig. 4 is an edge view of the same, Fig. 5 is a detail partial side view of a preferred stylus, Fig. 6 is a side view of a portion of the tilted form of phonographic arrangement, Fig. 7 is a plan view of a disk record machine furnished with my improvement, and  
35 Fig. 8 is a side view of the same shown level.

The term "phonograph" is intended to apply to any type of machine reproducing sound from a record.

My improved tone-projecting element, whether employed telephonically, phonographically or otherwise, comprises a source of acoustic waves (such for instance as a vibrating diaphragm) which may be termed a tone-producing element, and tone-modifiers, whereby the components of the origi-

inal vibrations are so reinforced as to preserve to the fullest possible extent the individual character of the voice or group of acoustic vibrations intended to be projected, while obtaining the desired volume of  
55 sound. One novel feature of the tone projector is found in the blending of the waves from both sides of the tone producer, by turning back those delivered from one side until they are projected in a common group  
60 with those from the other side. Another novel feature is found in the provision of a compound resonator, preferably arranged for correspondence to the three principal recognized voice registers known as treble,  
65 middle and bass. By uniting the two novel features above named in the compact embodiment herein shown and described, I am able to produce a perfectly natural voice effect, since I avail myself of the natural  
70 human organization of two orifices (mouth and nose) combined with compound resonators (palate and head bones) suited to the elements of voice projection. I am  
75 able to obtain the desired volume of sound without use of a horn, and I avoid the false resonance of horns, "blasts" and the like, whose disagreeable effects are well known. Certain other features of advantage flowing from various elements of my invention are  
80 set forth hereinafter.

While I have described my tone projector hereinafter in connection with its preferred embodiment in a phonograph, it is to be understood that, except as otherwise ex-  
85 pressly stated in my claims, I am not limited to this field of use.

In the form shown the tone producer is a diaphragm 10 of any suitable form and material, mounted within the supporting ring  
90 11, which latter is provided with a partition 12, having a tone orifice 13. Between this partition and the diaphragm there is a suitable space which I call the compression chamber, and within which I prefer to em-  
95 ploy a clarifier, consisting of a disk 14 having a series of openings 15 preferably formed by cutting the substance of the disk and bending the same to form wings 16 out of the plane of the disk, and preferably  
100



at right angles to the same. I have found that the best effects are produced where each orifice 15 has at least one straight edge placed radially, and where, as clearly shown in Fig. 4, the wings are bent alternately toward opposite sides of the disk. It is also advisable to supply a central aperture 17 in this disk, to get the best effect. I have determined by careful experiments that by introducing a disk or plate of this character, certain head tones of the human voice, which are otherwise blurred, are brought out distinctly.

Beyond the tone orifice 13, the ring 11 is supplied with the first member 18 of the compound resonator, which causes the waves which pass through and radiate from the orifice 13 again to converge to a new point of departure. This first member preferably takes the form of a shell which is exteriorly concave and correspondingly convex within.

Surrounding the first member, and preferably also mounted upon the ring 11 is the second member 19 of the compound resonator. This is preferably a shell principally convex without and correspondingly concave within, although it takes the opposite curvature for a short distance around its opening, as shown.

The third and outermost member of the compound resonator is capable of being employed as a support for the other elements herein described, and this is the preferred form shown. Whether employed as a support or not, however, I prefer also to employ it to gather and reverse the issuing sound waves, so as to cause them to join those given off from the opposite side of the source or producer. For this reason it may be termed the "reversing resonator". In the preferred form shown this last member is a hollow shell 20 surrounding the ring 11 and the inner resonating members, and supporting the same by means of screws 21, which engage the ring 11, as shown in Fig. 2. As shown in the drawings this shell acts to reflect the modified acoustic waves given off from that side of the diaphragm 10 shown uppermost in Fig. 2, and this reflection takes place through a ring shaped space surrounding the opening 22 of the sounding shell 23 through which last named opening are delivered the waves from the lower side of said diaphragm. I have found this novel method of blending the waves from the two sides of the tone source to give especially good results. The shell 23 may be held removably in place by any suitable means, as, for instance, the screws 24, passing through the edge of the ring 11.

I have found that the organization above described gives the natural effect produced in the human voice by the resonating cavities and surfaces within the head; and, while getting the same volume of tone as obtain-

able from a tone arm and horn, I avoid the unpleasant false qualities inseparable from the use of horns.

The devices thus far described may be used in various ways in connection with phonographs, and in the drawings I have shown a preferred arrangement in connection with disk record machines.

The table 25 is mounted in any well known manner for rotation upon a suitable shaft 26 by motor mechanism within the casing 27. The handle 28 is employed for winding up the motor, when a spring motor is used. The usual stop is shown at 29. The disk record is mounted upon the table 25 as shown in Fig. 8 at 30. The record is omitted from Fig. 7.

At the side of the casing 27 there is placed a post 31 having a socket at its top into which there fits loosely the down turned stud 32 upon the arm 33. An arm 34, fixed to the side of the external shell 20, is hinged at its end to the end of the arm 33, as shown at 35. This hinge permits vertical play of the shell 20 and its contents, while the stud 32 turns within its socket to permit the horizontal movement incident to the following of the record groove by the stylus. By turning the arm 34 and shell 20 upward around the hinge 35 the instrument can be thrown into inoperative position in a well known manner.

In Figs. 7 and 8 the table 25 which carries the record 30 is shown level and this is within my invention; but I prefer to give the table and record a material inclination as shown somewhat exaggerated in Fig. 6. This inclination facilitates the forward movement of the shell and the stylus across the record whether starting from the circumference and moving toward the center or starting below the center and moving outward to the circumference.

As shown in Figs. 1 and 6, at 36, the edge of the shell 20 is cut away to permit insertion of the stylus which may be mounted in any suitable manner, but preferably as herein shown and described. In my preferred mounting the usual removable needle 37 is tightly clamped within the stylus body 38 by means of a set screw 39 or otherwise and the body 38 is mounted for vibration in a plane at right angles to the plane of the diaphragm. For this purpose I prefer to employ lugs 40 on the ring 11 between which the body 38 is inserted, being supported by a torsional mounting composed either of a fine wire 41 as shown in Fig. 1, or of two fine wires at a suitable distance apart as shown at 42 in Fig. 5. The wire or wires are fixed firmly both to the body 38 of the stylus and to the lugs 40 and the vibration of the stylus upon its mounting is accomplished by a twisting of the wire mounting.

There projects from the body 38 the usual



contact arm 43 which makes contact with the center of the diaphragm as shown in Fig. 1. As well understood in the art, the extremity of the arm 43 may or may not be fixed to the diaphragm.

The mounting described is extremely simple and has been found to give excellent results in practice. It permits the removal of the stylus with great ease.

Various changes may be made in the construction of my improvement without departing from my invention and I do not limit myself to the details herein shown and described.

What I claim is—

1. In a phonograph, and in combination with the record support and record moving means thereof, an external hollow reflector having a single opening for emission of sound, a diaphragm mounted within said reflector near the opening thereof, a sounding shell mounted over the outer face of said diaphragm and projecting beyond the plane of the opening in said reflector, a stylus adapted to act upon said diaphragm, and mounting means for said reflector adapted to permit movement thereof over the record, substantially as described.

2. In a phonograph, and in combination with the record support and record moving means thereof, a hollow external reflector having a single opening, a diaphragm suitably mounted near said opening within said reflector, a stylus adapted to act thereon, a sound conveying shell directed inward from said diaphragm away from the reflector opening, a second sound conveying shell directed outward from said diaphragm through said opening, and mounting means for said reflector adapted to permit movement thereof over the record, substantially as described.

3. In a phonograph and in combination with the record support and record moving means thereof, a hollow reflector substantially of the shape of a sphere with a segment removed along a plane so placed as to afford a constricted opening, a diaphragm mounted within said reflector substantially parallel to the plane of said opening, a sounding shell applied over the outer face of said diaphragm and projecting outside of said opening, a stylus adapted to act upon said diaphragm, and mounting means for said reflector adapted to permit movement thereof over the record, substantially as described.

4. In a phonograph, means for moving the record and a support for said record moving means; in combination with a compound resonator adapted to move as a whole over said record and comprising an inner

shell outwardly concave an outer shell outwardly convex and a shell surrounding both, and a diaphragm and stylus associated with said resonator and adapted to move therewith, substantially as described.

5. In a phonograph, means for moving the record and a support for said record moving means; in combination with a resonator adapted to move as a whole over said record, a diaphragm within said resonator, a tone-clarifying disk mounted behind said diaphragm and having substantially radial slits therein each provided with a projecting wing on one side, and a stylus operatively connected with said diaphragm, substantially as described.

6. In a phonograph, means for moving the record and a support for said record and moving means; in combination with a resonator adapted to move as a whole over said record, a diaphragm within said resonator, a tone-clarifying disk mounted behind said diaphragm and having substantially radial slits therein, each provided with a projecting wing on one side, and the wing on each slit projecting in a direction opposite to that on the next, and a stylus operatively connected with said diaphragm, substantially as described.

7. In a phonograph and in combination with the record-support and record moving means thereof, a dome-shaped reflecting shell having a single opening constricted with relation to the principal diameter of the shell, a diaphragm within said shell placed across and just behind the central portion of said opening so as to leave a ring-shaped space around it for emitting sound waves reflected from within the shell, a stylus operatively connected with said diaphragm and mounting means for said shell adapted to permit movement thereof over the record.

8. In a phonograph and in combination with the record-support and record moving means thereof, an external hollow reflecting shell having a single opening constricted with relation to the principal diameter of the shell, an internal resonator and diaphragm combined adapted to be inserted through said opening into said shell, means for holding said resonator and diaphragm within said shell, a stylus operatively connected with said diaphragm and mounting means for said shell adapted to permit movement thereof over the record, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

HARRY W. HESS.

Witnesses:

H. S. MACKAYE,  
KATHARINE C. MEAD.



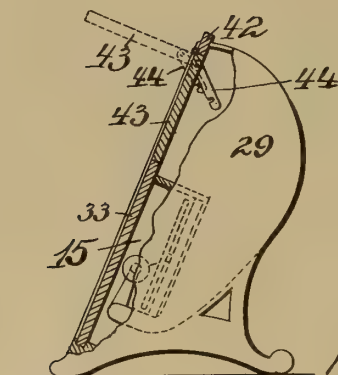
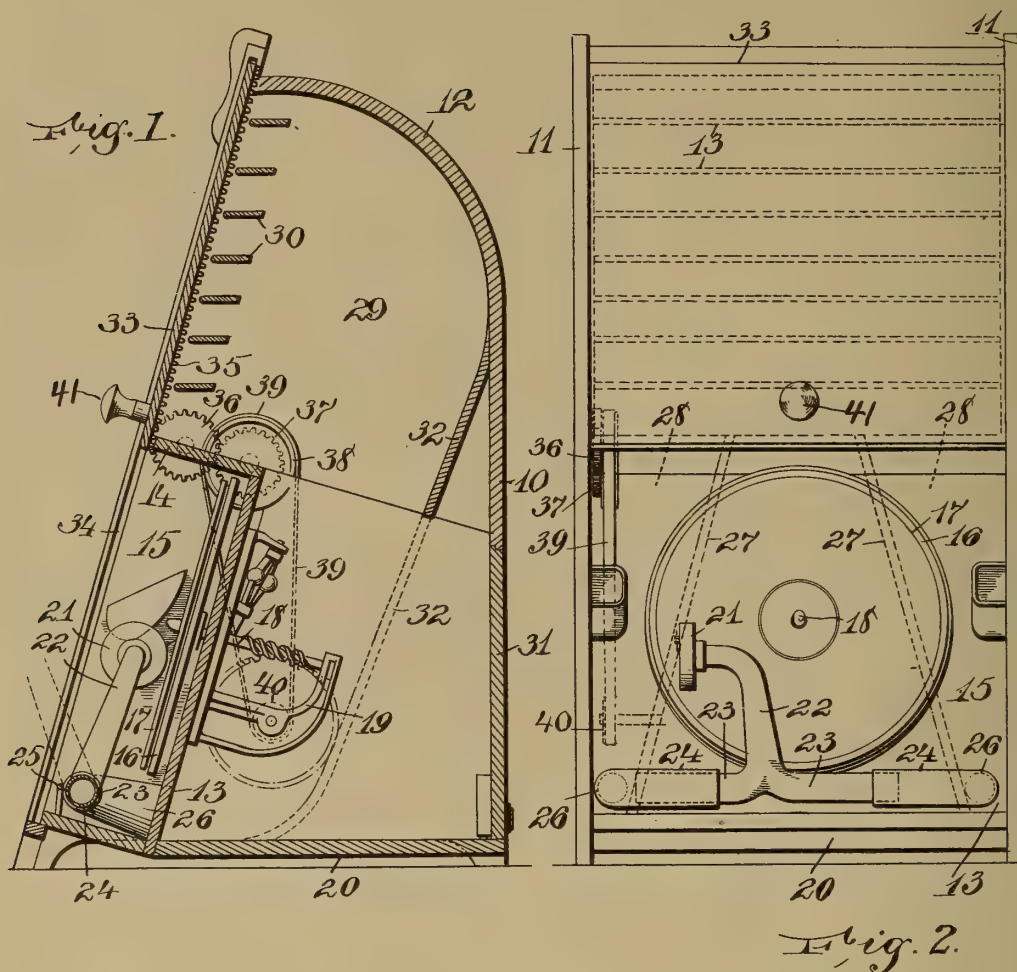
TALKING MACHINE,  
 # 1,138,843-----W. H. Camfield,  
 Patented-May 11, 1915.  
 Filed-May 11, 1914.



W. H. CAMFIELD.  
TALKING MACHINE.  
APPLICATION FILED MAY 11, 1914.

1,138,843.

Patented May 11, 1915.



WITNESSES:  
M. A. Johnson  
H. G. Gantwetter.

INVENTOR  
William H. Camfield

# UNITED STATES PATENT OFFICE.

WILLIAM H. CAMFIELD, OF NEWARK, NEW JERSEY.

## TALKING-MACHINE.

1,138,843.

Specification of Letters Patent. Patented May 11, 1915.

Application filed May 11, 1914. Serial No. 837,671.

*To all whom it may concern:*

Be it known that I, WILLIAM H. CAMFIELD, a citizen of the United States, and a resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to an improved talking machine of either the disk or cylinder type in which a casing with a lid is used, and the invention is designed to provide for the winding of the motor of the machine by the moving of the lid.

The machine has a connection between the winding means of the motor and the lid so that when the lid is operated, the winding means is actuated to put the motor under tension to play the succeeding record.

The invention permits the use of a light weight or spring as motive power, as the automatic winding of the motor at each operation of the lid necessitates only enough power to play one record.

To more fully perfect the machine I have devised a construction in which the parts are so disposed that the lid must be operated to give access to the record and must be again operated to uncover the horn, in this way insuring a winding of the motor at the installation of each record.

The invention further provides for an improved talking machine in which the arrangement of the parts allows the base of the machine to be small so that it can be placed on an ordinary stand or table, but at the same time allows a comparatively long sound passage or horn which is desirable to secure clear and loud reproductions from the record.

A still further object of the invention is to provide a horn which is contained within the casing of the machine, but which avoids the motor in order to prevent the noise of the motor from being heard during the reproduction by the machine. This is preferably accomplished by forming the sound passage into two channels between its outlet end and its reproducer end to form a space in which the motor is placed. This arrangement also permits the inspection of the motor while the machine is operating. It will be further understood in this invention that the motor is in a casing formed by walls of the horn passages, and the casing thus formed provides a convenient position of the motor of the talking machine

and at the same time does not interfere in any way with the transmission of sound through the horn passages.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section through the center of Fig. 2, illustrating my new form of talking machine. Fig. 2 is a front view of the machine shown in Fig. 1. Fig. 3 is a side view, partly broken away, showing a talking machine with a modified form of lid.

In my improved form of talking machine the figures of the drawing embody one type of machine, but it will be understood that changes can be made in the details of construction without departing from the scope of the invention.

The machine consists of a casing which can be ornamented or left plain if desired, and can also be made in a variety of shapes, the general design however being formed as a compact cabinet or casing with a record chamber and horn outlet which are adapted to be closed by a lid or door common to both. In the form illustrated, the casing consists of a back 10 and sides 11, the back extending forwardly at the top, as at 12, and terminating at the front, the front being open and adapted to be closed by a suitable door. A transverse partition 13 and a strip 14 form a record chamber 15 at the front of the machine. The record chamber is supplied with any suitable record-holding device, the type shown consisting of a turn table 16 on which the record 17 is placed, the turn table being mounted on a spindle 18 driven by a suitable motor. I illustrate a spring motor 19 which is fastened to the back of the partition 13. The casing has a bottom 20.

In the record chamber is arranged the reproducer or sound-box of the machine, the drawing showing an ordinary sound-box 21 which is fastened at the end of an extension 22 of a tube 23, the whole forming a T-shaped tube. The tube thus has two outlets which slide in tone arms 24, the tube sliding freely in the tone arms, but being fitted close enough to fully transmit the sound. The tube and the sound-box are thus free to move when the stylus is moved by the groove in the record. A stop 25 limits the swing of the tube when the stylus is withdrawn from the record. The tube 23 is freely rotatable in the pipes and can be



easily swung to control the placing and removal of the stylus on and from the record. The tone arms 24 are bent backward at their outer portions as at 26 and pass into the partition 13, thus directing the sound vibrations from the reproducer and tube to the rear of the partition. The walls 27 are so placed as to form two side channels 28, and these channels being sound-channels and being separated, they allow a slanting or flaring of the partitions 27. The channels 28 open at their tops into the chamber 29 which is the large end of the horn and directs the sound past the resonance boards 30, although these are not essential. The walls 27 form a space between them in which the motor is placed out of the path of the sound and easy of access through a door 31. A rear wall 32 extending across the channels 28 assists in directing the sound through the horn and forms, with the walls 27, a well defined pair of sound-channels leading to the big end of the horn.

A lid is placed on the front of the casing to alternately close the record chamber and the big end of the horn. In the drawing I illustrate a sliding lid 33 moving in suitable ways 34. The lid is proportioned so as to cover the record chamber or the horn. This necessitates a sliding of the lid to give access to the record, and then it is necessary to move the lid in order to uncover the horn to let the sound escape. This compulsory movement at the playing of each record insures the confinement of any squeaks or scratches from the needle and the sound from them does not escape. Another feature of the compulsory sliding is that it insures the operation of a winding mechanism when such mechanism is connected to or operated by the lid. In the form shown I place a rack 35 on the back of the lid, the rack meshing with a pinion 36, this in turn operating a gear 37 which is on a shaft with a pulley or sprocket 38 connected by a chain or belt 39 to a winding device 40 which is not shown in detail and can be the usual ratchet mechanism now commonly employed in this type of machine and well known to those skilled in the art. A suitable handle 41 is placed on the lid 33 for its easy manipulation. I do not wish to be understood as limiting myself to a sliding lid, as other kinds of movable lids can be employed for alternately closing the record chamber and the horn.

In the modifications shown in Fig. 3 I provide the door 33 with an extension 42 in which can be mounted a supplemental lid 43, this supplemental lid being adapted to be opened and left open while the machine is in use, but closed to keep dust from the horn when the machine is not in use. A suitable stop 44 holds the supplemental lid open. The winding means is so arranged

that it winds up when the lid is pushed down, to tighten the spring in the motor, whereby the resistance of the spring holds the lid up and the weight of the lid assists in the winding and thus makes it easy.

It will be noted that the inclined position of the reproducer of the sound-box permits of a heavier and more massive reproducer being used and at the same time will not bear any heavier on the record than the kind which was formerly arranged horizontally. This heavy reproducer is less liable to vibrate and is adapted to transmit more readily the sound without the accompaniment of the scratching or singing of the stylus which is sometimes present in machines using a lighter weight reproducer.

Having thus described my invention, what I claim is:—

1. A talking machine comprising a casing having a record-reproducing chamber and having a sound conveying means leading from said chamber, and means for alternately closing the record-reproducing chamber and sound conveying means.

2. A talking machine comprising a casing having a record-reproducing chamber and having a sound conveying means leading from said chamber, and a lid so disposed that it can be moved to alternately close the record-reproducing chamber and the sound conveying means, so that the opening of one insures the substantial closing of the other.

3. A talking machine comprising a casing, a sound chamber at the top thereof and opening at one side, a pair of sound channels formed in the casing and connected to the chamber, a motor between the channels, the casing having a record chamber under the sound chamber, and a sound-box in the record chamber and in communication with the channels.

4. A talking machine comprising a casing, a sound chamber at the top thereof and opening at one side, a pair of sound channels formed in the casing and connected to the chamber, a motor between the channels, the casing having a record chamber under the sound chamber, a sound-box in the record chamber and in communication with the channels, and a lid arranged to close both the sound chamber and the record chamber.

5. A talking machine having its record-reproducing chamber and its horn side by side, and a lid to slide over both and adapted to alternately close them.

6. A talking machine comprising a casing having a record-reproducing chamber, a horn with its sound receiving means, the horn having its large end adjacent to the chamber, and a lid to alternately close the horn and the chamber.

7. A talking machine with a record-reproducing chamber, a horn with its large



end adjacent to the chamber and on the same face of the machine, the horn extending behind the chamber and with its sound-box in the chamber, and a single lid arranged to alternately close both the horn and the chamber.

8. A talking machine having chambers forming a record-reproducing chamber and the large end of the horn, the openings of said chambers being on the same face of the machine, and a lid common to both openings and so mounted that it closes said openings alternately.

9. A talking machine having a substantially U-shaped sound-conveying horn, the machine having a record chamber placed so that the horn passes around three sides of the chamber, and a single lid for alternately closing both the chamber and the large end of the horn.

10. A talking machine comprising a casing formed with a U-shaped horn within it, and with a record-reproducing chamber so placed that the horn passes around three sides of said chamber, a record rotating device in the chamber, a sound-box in the chamber and in communication with the horn, and a sliding lid arranged on the front of the casing and adapted to close the record chamber and the large end of the horn.

11. A talking machine comprising a casing with an inclined record chamber at the front, a sound-box in the record chamber, a horn connected with the sound-box and extending behind the record chamber and then

to the front above the record chamber, and a lid on the front of the machine and adapted to alternately close both the record chamber and the horn.

12. A talking machine comprising a casing with an open front, a record-reproducing chamber in said front, a horn having its big end opening in said front of the casing, a motor in the casing, a sliding lid in the front of the casing and adapted to close the openings in the front thereof, a rack on the back of said lid, and an operative connection between the rack and the motor for winding the motor when the lid is slid.

13. A talking machine comprising a casing with an inclined record-reproducing chamber at the front, sound conveying means extending from said chamber at the bottom thereof and extending behind said chamber and then forward above the chamber, said sound conveying means being divided behind said record-reproducing chamber, a motor secured to the back of said record-reproducing chamber and between the divided portions of said sound conveying means, and an opening in said casing to provide access to said motor between the divided portions of said sound conveying means.

In testimony that I claim the foregoing, I hereto set my hand, this 8th day of May, 1914.

WILLIAM H. CAMFIELD.

Witnesses:

M. A. JOHNSON,  
H. TRAUTVETTER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



TALKING MACHINE,  
# 1,139,224-----W. H. Pumphrey,  
Patented-May 11, 1915.  
Filed-October 5, 1911.

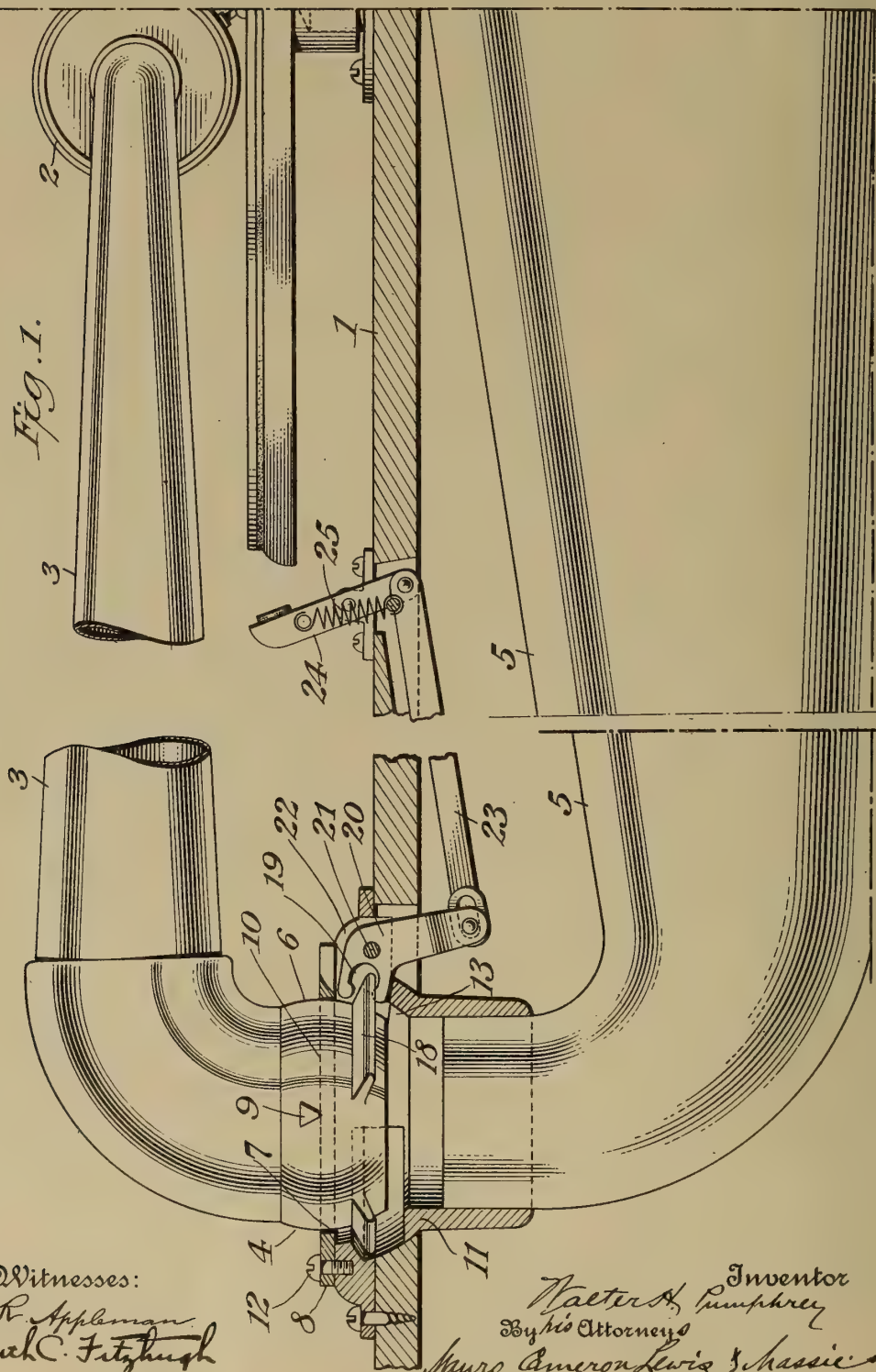


W. H. PUMPHREY.  
TALKING MACHINE.  
APPLICATION FILED OCT. 5, 1911.

1,139,224.

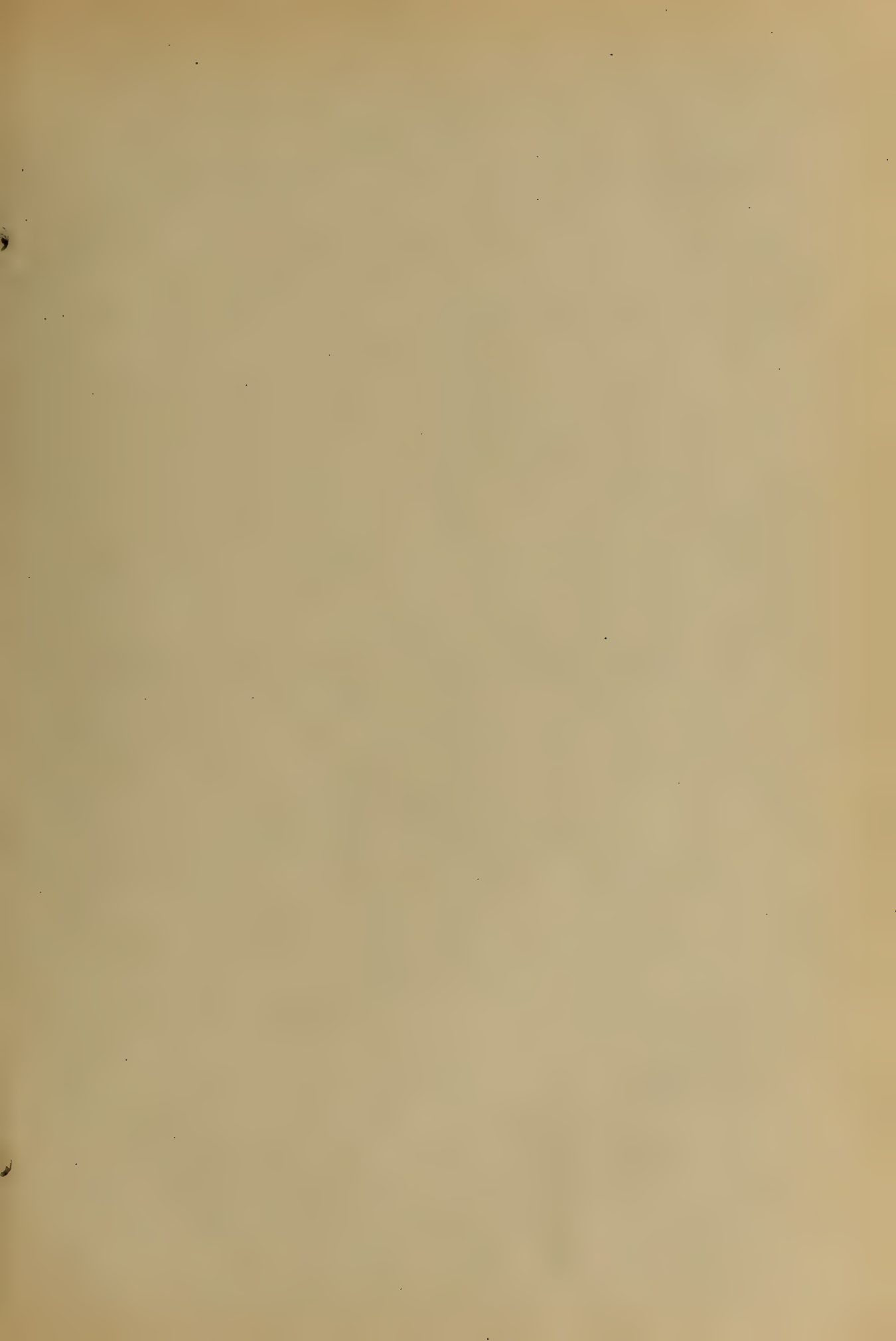
Patented May 11, 1915.  
2 SHEETS—SHEET 1.

Fig. 1.



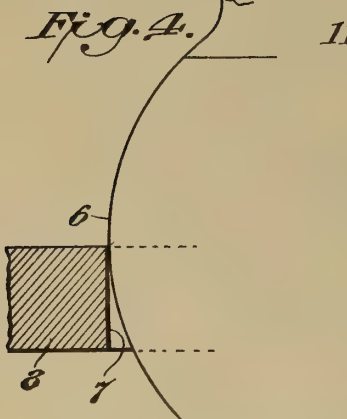
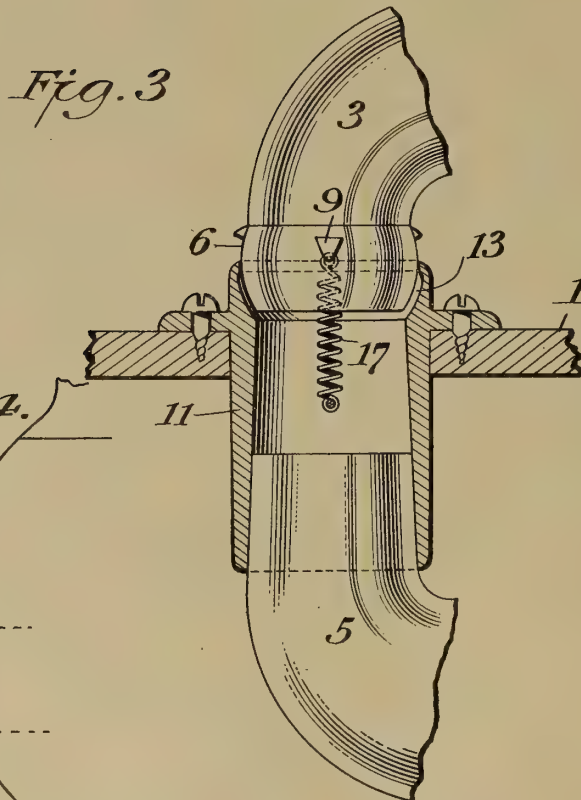
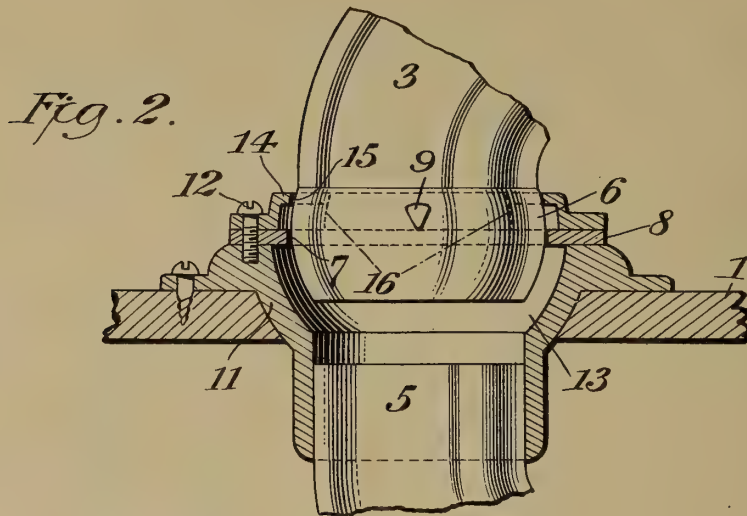
Witnesses:  
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Inventor  
Walter H. Pumphrey  
By his Attorneys  
Mauro, Ameron, Lewis & Massie



1,139,224.

Patented May 11, 1915.  
2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

WALTER HYER PUMPHREY, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## TALKING-MACHINE.

1,139,224.

Specification of Letters Patent.

Patented May 11, 1915.

Application filed October 5, 1911. Serial No. 652,916.

*To all whom it may concern:*

Be it known that I, WALTER H. PUMPHREY, a citizen of the United States of America, residing at New York, in the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates generally to talking-machines and has particular reference to the mounting of the tone-arm thereof.

The object of the invention is to produce a mounting for the tone-arm employing a minimum number of parts, of extremely simple construction, which may be manufactured at a comparatively low cost and quickly assembled.

A further object is to arrange the parts in such relation as to make them readily accessible and facilitate their removal for purposes of examination or repair, etc.

A further object is to minimize friction in the mounting without in any way interfering with or limiting the freedom of movement of the tone-arm.

These and other objects and advantages are attained by the construction hereinafter described.

The accompanying drawings will serve to illustrate mechanism suitable for carrying my invention into effect. I wish it understood, however, that I do not limit myself to either the exact form or the details shown, as various changes may be made within the meaning of the present invention.

In the drawings: Figure 1 is a longitudinal section illustrating the application of my invention to a well known type of talking-machine, employing a disk record and a concealed horn. Fig. 2 is a similar view, showing the use of a ring for retaining the tone-arm in position. Fig. 3 is a sectional view, illustrating a modified form of mounting. Fig. 4 is an enlarged detail view.

Referring now to the drawings, 1 represents a talking machine of a form in common use, a portion of the motor cabinet being here shown, having a turn-table mounted thereon as a support for a disk type of record, with which a sound reproducer 2 is adapted to coöperate, in the usual manner.

The sound-box or reproducer 2 is secured to the free end of a tone-arm 3, which is mounted at 4, as will be hereinafter de-

scribed, to have movement and swing freely in both vertical and horizontal planes, in order that the stylus of the reproducer may track in the record-groove and be fed across the disk by it, in the usual manner.

The mounting, shown at 4, serves to connect the tone-arm and the sound-amplifying means, which latter appears here as a concealed horn 5, *i. e.* a horn contained within the cabinet, and as the shape and arrangement of the same form no part of the present invention, it will not be further described.

The preferred construction of mounting is illustrated in Fig. 1, and takes the general form of a ball-and-socket joint, the end 6 of the tone-arm being shaped exteriorly as a portion of a sphere, which is fitted to turn freely in any direction in an opening 7 in a ring-plate 8. The tone-arm is supported thus and its movement is limited to vertical and horizontal planes, by diametrically-opposite projections 9 from the spherical portion of the arm, which co-act with an annular bearing 10, formed by the upper surface of the ring-plate 8, just referred to.

It will be observed that the annular surface or wall of the opening 7 meets the spherical surface of the tone-arm in tangential relation throughout the circumference thereof, and that the line of contact coincides with the plane of the upper surface or bearing 10 of the ring-plate and also with the center of the spherical enlargement of the tone-arm. The ring-plate, thus arranged, presents two annular converging surfaces which meet or intersect along a circular line. These are the surface 7, serving to center the tone-arm in the mounting, and the bearing surface 10, acting as a support on which the arm maintains itself by its own weight, and on which it is freely movable both vertically and horizontally. This brings the vertical and the horizontal axes where they intersect in the plane of the surface 10.

As shown, the mounting for the tone-arm is made up of separable sections, one of which is the ring-plate 8, above referred to. The base section 11 has the ring-plate removably secured thereon by screws 12, and is preferably cut away interiorly as at 13, to clear the spherical portion of the tone-arm in all positions to which the latter may be swung.

Ordinarily, the tone-arm will maintain



itself in operative relation to the bearings by its own weight; but when the machine is being shipped or moved about from place to place, or is in the hands of careless users, it is desirable to provide means for holding the arm in position. For this purpose, a third section 14 may be employed in the form of a retaining-ring, as shown in Fig. 2. The ring 14 is cut away interiorly to normally clear the spherical portion of the tone-arm but encircles it closely enough at 15, above the point of greatest diameter, to prevent accidental removal of the arm from the mounting.

From the foregoing, it will be seen that only one section of the mounting is in contact with the arm and that such contact is limited to the engaging faces of the projections 9 on the bearing 10. The tangential relation between the wall of the opening 7 and the spherical portion of the arm reduces the engagement to a mere line of contact and the fact that such line is in the plane of the arm-supporting bearing 10, minimizes friction and reduces the function of the bearing 7 to that of a mere guide to maintain the arm in centered relation in the mounting.

It is desirable to limit the swing of the tone-arm across the record, and for this purpose the retaining-ring 14 may be cut away as shown, to provide shoulders 16, 16, which co-act with the projections 9, as stops.

In Fig. 3 I have shown a one-piece mounting having the same general characteristics as the construction just described; but in this instance a helical spring 17, centrally located interiorly of the arm and mounting, is substituted for the retaining-ring 14 shown in Fig. 2, and serves to yieldingly maintain the arm in operative relation in the mounting, and against accidental removal.

The form of arm and a mounting illustrated in Figs. 1 and 2 is specially adapted for automatically operating a motor-brake of the type disclosed and claimed in my prior Patent No. 1,006,128, granted Oct. 17, 1911. The brake referred to is of the spring-thrown type but requires to be positively advanced or retracted a definite distance before the spring acts to throw the brake either on or off; and for the purpose of imparting such movement to the brake, there may be formed on the spherical portion of the arm a lip 18, shaped to enter the notched end 19 of a lever 20, pivoted at 21, in a slot 22, in the base section of the mounting, and connected through a rod 23 with the brake-lever 24. Thus arranged, upward movement of the tone-arm to lift the sound-box or reproducer clear of the record, will be imparted to the brake lever, through the connection described, to shift the brake far enough for the spring 25 to act and apply the same; and

the reverse or downward movement of the sound-box (to playing position on the record) will, in a similar manner, be transmitted to cause the spring to act in throwing off the brake.

The lip 18 on the tone-arm is given such length as to insure its remaining in engagement with the notched end of the lever 20, in any and all positions to which the tone-arm may be swung, and when sufficiently extended, retaining-ring 14 may be dispensed with.

The many important advantages of my invention will be apparent from the foregoing, as will also the mode of operation and use and further description thereof will not be given.

Having, therefore, described my invention, I claim:

1. In a talking machine, the combination of a tone-arm supporting ring provided with a bearing surface, and a tone-arm arranged to have both vertical and horizontal movements, the axes of which movements intersect in the plane of said bearing surface.

2. In a talking machine, the combination of a horizontally disposed tone-arm supporting ring provided with a bearing surface, and a tone-arm shaped at one end as a portion of a sphere, and arranged to have both vertical and horizontal movements, the axes of which movements intersect in the plane of said bearing surface.

3. A tone-arm shaped exteriorly at one end as a portion of a sphere, and a mounting for the spherical end of the arm comprising a member having two annular surfaces relatively arranged to contact with the arm only in a plane passing through the center of the sphere, one of said surfaces forming a bearing surface.

4. A tone-arm shaped exteriorly at one end as a portion of a sphere and a mounting for said spherical end of the arm comprising a member having two annular surfaces relatively arranged to contact with the arm only in a plane passing through the center of the sphere, one of said surfaces forming a bearing surface, and retaining means for the arm above said bearing surface.

5. A tone-arm shaped exteriorly at one end as a portion of a sphere and a mounting for the shaped end of the arm comprising a bearing member having two annular surfaces relatively arranged to contact with the arm only in a plane passing through the center of the spherical portion thereof, and a removable retaining ring for the arm above the bearing member.

6. A tone-arm shaped exteriorly at one end as a portion of a sphere and a mounting for the shaped end of the arm comprising a bearing member having two annular surfaces relatively arranged to contact with the arm only in a plane passing

through the center of the spherical portion thereof, a removable retaining ring for the arm above the bearing member, and coacting means on the tone-arm and mounting to limit the movement of the arm.

7. In a talking machine, the combination of a tone-arm bearing surface, and a tone-arm arranged to have both vertical and horizontal movements, the axes of which movements intersect in the plane of said bearing surface, said tone-arm having a part in the form of a portion of a sphere contacting with said bearing surface only in the plane of said surface.

8. In a talking machine, the combination of an annular tone-arm bearing surface, and a tone-arm arranged to have both vertical and horizontal movements, the axes of which movements intersect in the plane of said bearing surface, said tone-arm having a spherical portion contacting with said bearing surface only in the plane of said surface.

9. In a talking machine, the combination of a horizontally disposed tone-arm bearing surface, and a tone-arm arranged to have both vertical and horizontal movements, the axes of which movements intersect in the plane of said bearing surface,

said tone-arm having a part in the form of a portion of a sphere contacting with said bearing surface only in the plane of said surface.

10. In a talking machine, the combination of a tone-arm supporting ring, and a tone-arm having a part in the form of a portion of a sphere resting within said ring and contacting with the same only in the plane of the supporting surface thereof, said tone-arm being arranged to have both vertical and horizontal movements, the axes of which movements intersect in the plane of the supporting surface of said ring.

11. In a talking machine, the combination of a tone-arm supporting ring having two surfaces which converge and meet in a circular line, and a tone-arm having a part in the form of a portion of a sphere which contacts with said ring only along said circular line, said tone-arm being arranged to have both vertical and horizontal movements, the axes of which movements intersect in the plane of one of said surfaces.

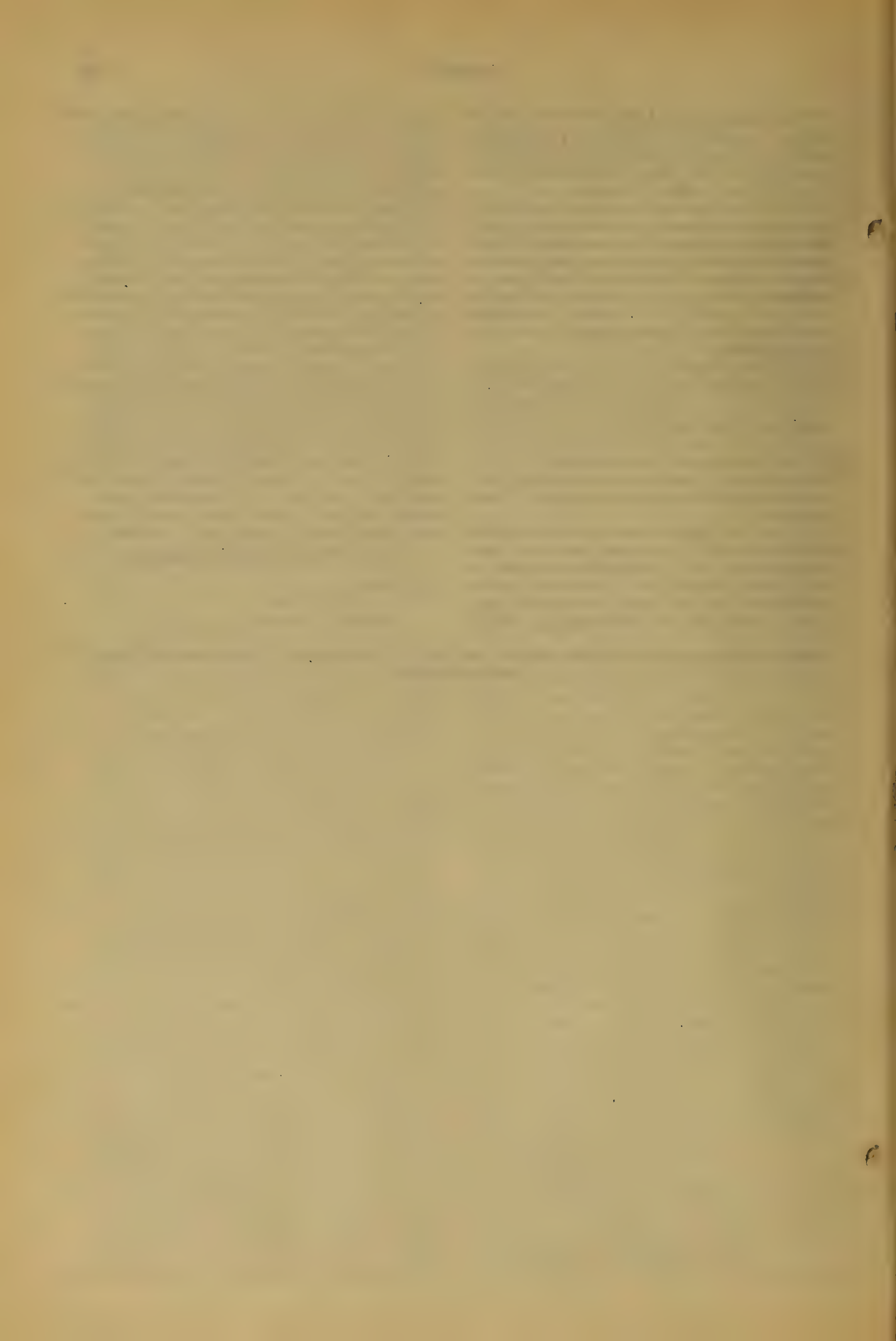
WALTER HYER PUMPHREY.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





SOUND REPRODUCING MACHINE,  
# 1,139,387-----C. W. Waller,  
Patented-May 11, 1915.  
Filed-December 18, 1911.

C. W. WALLER.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED DEC. 18, 1911.

1,139,387.

Patented May 11, 1915.

2 SHEETS—SHEET 1.

Fig. 1

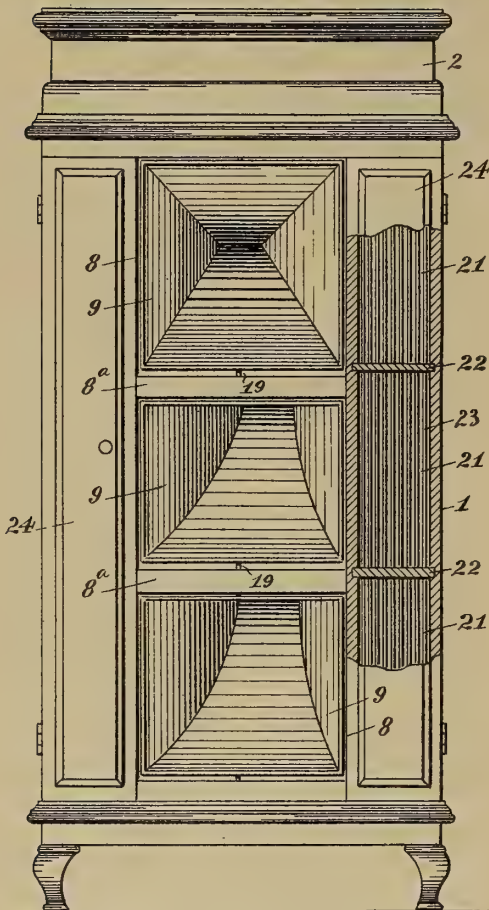


Fig. 2

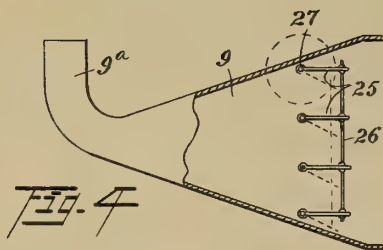
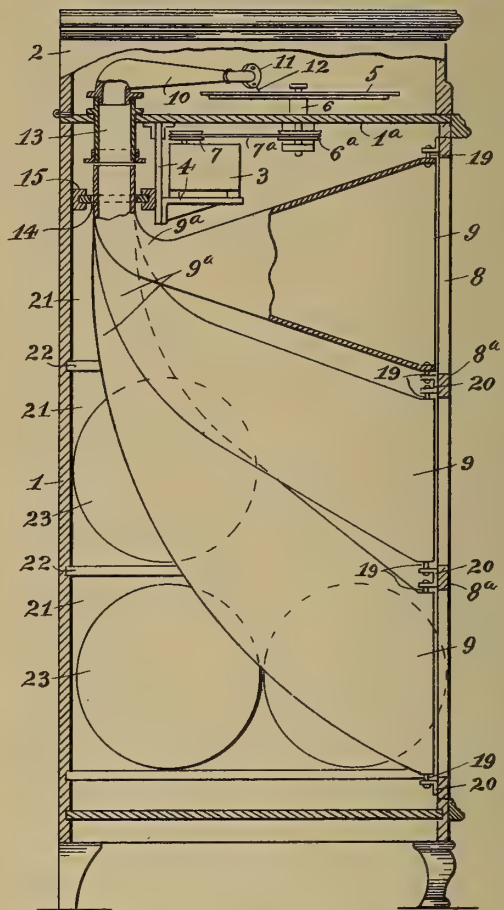
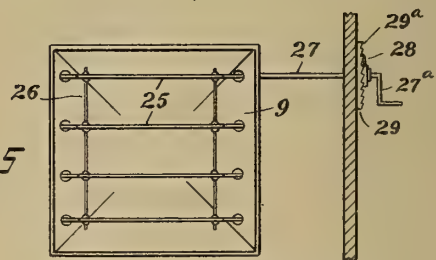


Fig. 4

Fig. 5



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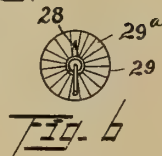


Fig. 6

Inventor  
Chas. W. Waller  
By O. B. Willman  
Attorney

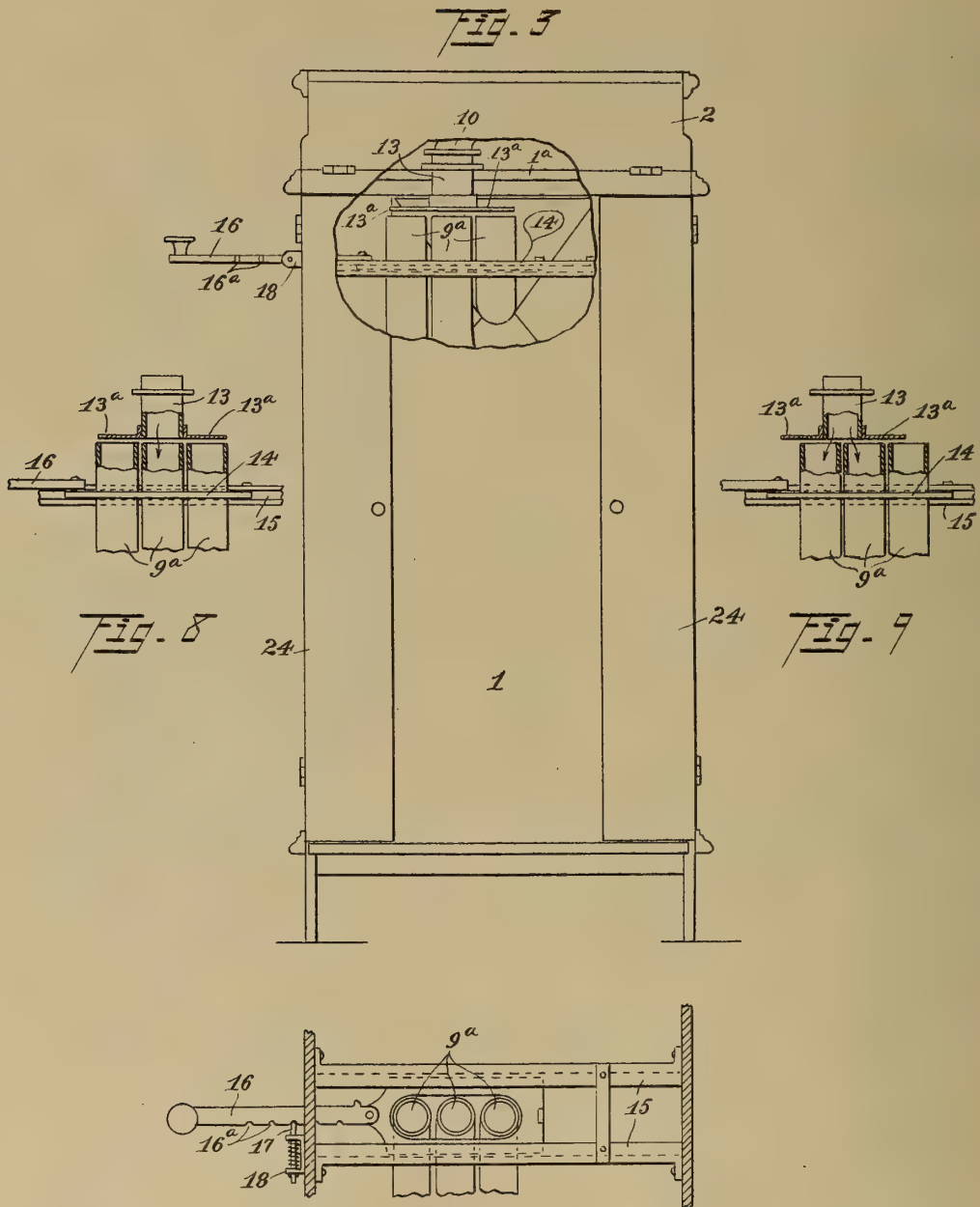




C. W. WALLER.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED DEC. 18, 1911.

1,139,387.

Patented May 11, 1915.  
2 SHEETS—SHEET 2.



Witnesses:  
*E. P. Schlosser.*

*Fig. 7*

Inventor  
*Chas. W. Waller*  
by *Chas. B. Willman*  
Attorney

# UNITED STATES PATENT OFFICE.

CHARLES W. WALLER, OF CHICAGO, ILLINOIS.

## SOUND-REPRODUCING MACHINE.

1,139,387.

Specification of Letters Patent.

Patented May 11, 1915.

Application filed December 18, 1911. Serial No. 666,326.

*To all whom it may concern:*

Be it known that I, CHARLES W. WALLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

My invention relates to improvements in sound reproducing machines of either the phonograph or graphophone type, and more particularly to that class of sound reproducing machines in which the sound reproducing and amplifying means are inclosed within a cabinet.

The primary object of the invention is to provide a generally improved sound reproducing machine of this class having improved amplifying means whereby the quality of the reproduction may be improved and regulated at the will of the operator and while the machine is in operation. In carrying out this object I provide a plurality of graduated amplifiers or horns having their open ends arranged at one side of the cabinet and their neck portions movably supported and adapted to be brought into and out of communication with the common sound conduit of the sound reproducing means whereby one or more amplifiers may be brought into use and the volume or strength of the tone regulated as desired. For example,—in the present embodiment of the invention the amplifiers or horns have their open ends superposed and are graduated from top to bottom for the production of a mild, medium or strong tone, respectively, or by bringing two of such amplifiers or horns in communication with the sound conduit a blended or intermediate tone will result.

A further object of the invention is to provide means whereby the reproduced sound issuing from the amplifier may be modified, controlled and directed at the mouth or open end of the respective amplifier and as issuing from the open side of the cabinet.

With the above mentioned and other ends in view, the invention consists in the novel construction, arrangement, and combination of parts, hereinafter described, illustrated in one of its embodiments in the accompanying drawings, and particularly pointed out in the appended claims.

Referring to the drawings forming a part of this specification, Figure 1, is a front

elevation of the improved sound reproducing machine of the cabinet type, a portion of the walls of the latter being broken away for the purpose of clearer illustration of the parts. Fig. 2, a similar view of the same, partly in section and partly in side elevation. Fig. 3, a rear view of the same, a portion of the rear wall being broken away for the purpose of clearer illustration of the parts. Fig. 4, a side elevation of an amplifying horn provided in its mouth or open end with sound modifying and deflecting elements. Fig. 5, a front elevation of the same. Fig. 6, a view of the handle operating and adjusting mechanism used in connection with the sound modifying and deflecting elements shown in Figs. 4 and 5. Fig. 7, a top plan view of the mechanism for movably supporting and adjusting the neck portions of the amplifiers or horns with respect to the common sound conduit communicating with the sound reproducing means. Fig. 8, a rear view of the same, showing an adjustment whereby the sound waves from the common sound conduit communicate directly with the neck portion of the second or intermediate amplifier. Fig. 9, a similar view showing an adjustment in which the sound waves communicate with the neck portions of two of such amplifiers.

Similar numerals of reference designate like parts throughout all the figures of the drawings.

The present embodiment of the improved sound reproducing machine comprises a cabinet consisting of a main body portion 1, provided at its top with a supporting wall or plate 1<sup>a</sup>, and a removable cover 2. The supporting wall or plate 1<sup>a</sup>, divides the main compartment of the cabinet from the supplemental or machine compartment above, and, in the present instance, supports the motor 3, through the medium of a depending bracket 4, and the turn-table 5, adapted to receive the disk record and being driven through the medium of a spindle 6, provided with a pulley 6<sup>a</sup>, communicating with a pulley 7, of the motor 3, through the medium of a cord or belting 7<sup>a</sup>.

The cabinet is provided at its front with a vertically extending opening 8, and a plurality of graduated amplifiers or horns 9, having their open ends superposed within said cabinet and along said opening, the enlarged or delivery ends of said amplifiers being preferably pivotally mounted, and



terminating at their rear in upwardly extending neck portions 9<sup>a</sup>, adapted to be brought into or out of communication with the sound box arm 10, or of the sound reproducing mechanism as hereinafter described.

The sound box arm 10, in the present instance, extends rearwardly from the sound box 11, and stylus 12, and is swivelly or pivotally connected to a common conduit pipe 13, extending through the supporting plate 1<sup>a</sup>.

As a means for movably supporting the neck portions 9<sup>a</sup> of the amplifiers 9, in proper relative position with respect to the common sound conduit 13, as well as providing means whereby said neck portions may be brought into and out of registry with said conduit member 13, for varying or modifying the tone or amplification of the sound waves, said neck portions 9<sup>a</sup>, extend through and are carried by a supporting slide member 14, the latter being connected to suitable guide members 15, secured to the rear walls of the cabinet immediately beneath the common conduit 13, the latter being preferably provided with wing members 13<sup>a</sup>, adapted to extend above the ends of the neck portions 9<sup>a</sup>, of the amplifiers when the latter are not brought into communication with the common sound conduit 13.

The slide member 14, is adapted to be operated through the medium of a handle 16, extending through the adjacent wall of the cabinet, said handle and the slide member 14, and neck portions 9<sup>a</sup>, being adapted to be moved to and secured in certain predetermined positions through the medium of a spring actuated bolt 17, mounted in a bracket 18, and adapted to rest within notches 16<sup>a</sup>, of the handle.

The upper, middle, and lower amplifiers 9, are adapted, in the present instance, to produce a mild, medium, and strong tone, respectively, and by reason of the construction just described, it will be observed that the horn or amplifier necks 9<sup>a</sup>, may be shifted laterally whereby to bring one or the other into direct communication with the common conduit 13, as for example,—the intermediate amplifier as shown in Figs. 3 and 8, or to direct the sound waves equally into two of such necks as shown in Fig. 9, of the drawings whereby the effect of the two amplifiers or horns will be obtained.

The front or open ends of the amplifiers may be secured along the open or front portion of the cabinet by means of pivot bolts 19, connected, in the present instance, to brackets 20, some of said brackets being secured, in the present instance, to transverse bars 8<sup>a</sup>, arranged in the opening 8. If desired, the opening 8, may be closed by a suitable door (not shown) when the instrument is not in use.

The sides of the main body portion 1, of

the cabinet may be divided into suitable compartments 21, through the medium of partitions 22, said compartments affording means for storing the disk records 23, and being adapted to be opened and closed through the medium of suitable panel doors 24.

As a means for further modifying and deflecting the sound waves, one or more amplifying horns may be provided at the mouth or delivery end with a plurality of sound modifying and deflecting elements 25, said elements being preferably pivotally mounted within the mouth of the horn and connected at their free ends by means of connecting links 26. As a means for operating and adjusting said elements 25, a rock shaft 27, may be provided, said shaft being suitably connected to one or more of the members 25, and extending through one wall of the cabinet and terminating in an operating handle 27<sup>a</sup>. As a means for securing said deflecting members or elements 25, in any position to which they may be adjusted, the shaft 27, may be provided with a spring pawl or member 28, adapted to seat itself in any of the notches or grooves 29<sup>a</sup>, of a disk plate 29, secured to the adjacent outer wall of the cabinet.

From the foregoing description, taken in connection with the accompanying drawings, the operation and advantages of my invention will be readily understood.

Having thus described an embodiment of my invention, what I claim and desire to secure by Letters Patent is,—

1. In a sound reproducing machine, a sound reproducer, sound conducting means, a plurality of graduated amplifiers having their open ends superposed, means for movably supporting said amplifiers independently of said sound conducting means, and means for selectively moving the receiving portions of one or more of said amplifiers into communication with said sound conducting means.

2. In a sound reproducing machine, in combination, a sound reproducer, sound conducting means, sound amplifying means comprising a plurality of sound amplifying chambers supported independently of said first mentioned means, and mechanism whereby one of said means may be moved selectively into communication with the other.

3. In a sound reproducing machine, the combination of a sound reproducer, sound conducting means, a plurality of sound amplifying means, and means whereby one of said means may be moved selectively into communication with the other.

4. In a sound reproducing machine, a cabinet having an open side, graduated amplifiers therein and having their open ends pivotally mounted and superposed

along said open side, sound reproducing means, and means for selectively bringing the latter into communication with one or more of said amplifiers.

5 5. In a sound reproducing machine, a plurality of amplifiers having their open ends superposed, sound reproducing means, sound conducting means, means for movably supporting said amplifiers independently of the latter, and means for selectively moving  
10 the receiving portions of one or more of said amplifiers into communication with said sound conducting means.

6. In a sound reproducing machine, the combination of sound reproducing means, a plurality of amplifiers, and means for moving said amplifiers to bring the same selectively into communication with said reproducing means.

20 7. In a sound reproducing machine, the combination with suitable sound reproducing means and a common sound conduit; of a plurality of pivotally mounted graduated amplifiers having their open ends superposed, and means for selectively moving the receiving portions of said amplifiers into and out of communication with said common sound conduit.

8. A sound reproducing machine, comprising a cabinet provided with an opening at one side, a plurality of graduated amplifiers mounted therein and having their open ends superposed along said opening, sound reproducing means provided with a common conduit, and means for movably supporting the neck portions of said amplifiers whereby the same may be brought into and out of communication with said common conduit.

40 9. In a sound reproducing machine, sound reproducing means, a sound discharge conduit, a sound box arm swiveled to the latter and supporting said sound reproducing means, a plurality of amplifiers, and means for supporting and moving the neck portions of the latter into and out of registry with said sound discharge conduit.

10. In a sound reproducing machine, a cabinet provided with an opening at one side and sound reproducing means at its top, a sound conducting means leading from the latter, a plurality of graduated amplifiers having their open ends superposed within said opening, and means for supporting and selectively bringing the neck portions of said amplifiers into and out of communication with said sound conducting means.

60 11. A sound reproducing machine, comprising a casing, sound reproducing means mounted therein, a plurality of amplifiers having their open ends arranged at one side of said casing, means for supporting and moving the neck portions of said amplifiers,

and a sound tube leading from said sound reproducing means and adapted to communicate with the neck portions of said amplifiers.

12. A sound reproducing machine, comprising a cabinet having a plurality of compartments and having an opening at one side thereof, sound reproducing means inclosed within one of said compartments, a plurality of amplifiers arranged within another of said compartments and having their open or delivery ends superposed at the open side of said cabinet, and means for movably supporting the neck portions of said amplifiers whereby one or more of the latter may be brought into communication with said sound reproducing means.

13. A sound reproducing machine, comprising a cabinet or casing having an opening at one side, sound reproducing means provided with a common sound discharge conduit, a plurality of pivotally mounted amplifiers having their open ends superposed at said opening at one side of said cabinet, and means for moving the neck portions of said amplifiers into and out of communication with said common sound discharge conduit.

14. A sound reproducing machine, comprising a cabinet having a plurality of compartments, sound reproducing means inclosed within one of said compartments, a plurality of amplifiers arranged within another of said compartments, means for movably supporting the sound receiving neck portions of said amplifiers, and a common sound pipe adapted to convey the sound waves from said sound reproducing means to one or more of said amplifiers.

15. A sound reproducing machine, comprising a cabinet having a plurality of compartments and having an open side, sound reproducing means inclosed within one of said compartments, a plurality of amplifiers within another of said compartments and having their delivery ends at the open side of said cabinet, and means for movably supporting the receiving portions of said amplifiers whereby one or more may be brought into communication with said sound reproducing means.

16. A sound reproducing machine, comprising a cabinet having a plurality of compartments, sound reproducing means inclosed within one of said compartments, sound amplifying means within another of said compartments, and means for movably supporting and adjusting said sound amplifying means relatively to and independently of said sound reproducing means.

17. A sound reproducing machine, comprising a cabinet having a plurality of compartments and provided with an open side leading to one of said compartments, sound



reproducing means inclosed within one of  
said compartments, a plurality of graduated  
amplifiers within another of said compart-  
ments and having their delivery ends super-  
posed within and along the open side of said  
cabinet, means for movably supporting said  
amplifiers independently of said sound re-  
producing means, and means for selectively  
bringing one or more of said amplifiers into

communication with said sound reproducing 10  
means.

In testimony whereof I have affixed my  
signature in presence of two witnesses.

CHARLES W. WALLER.

Witnesses:

GEORGE GRUBLE,  
W. A. FRANTZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

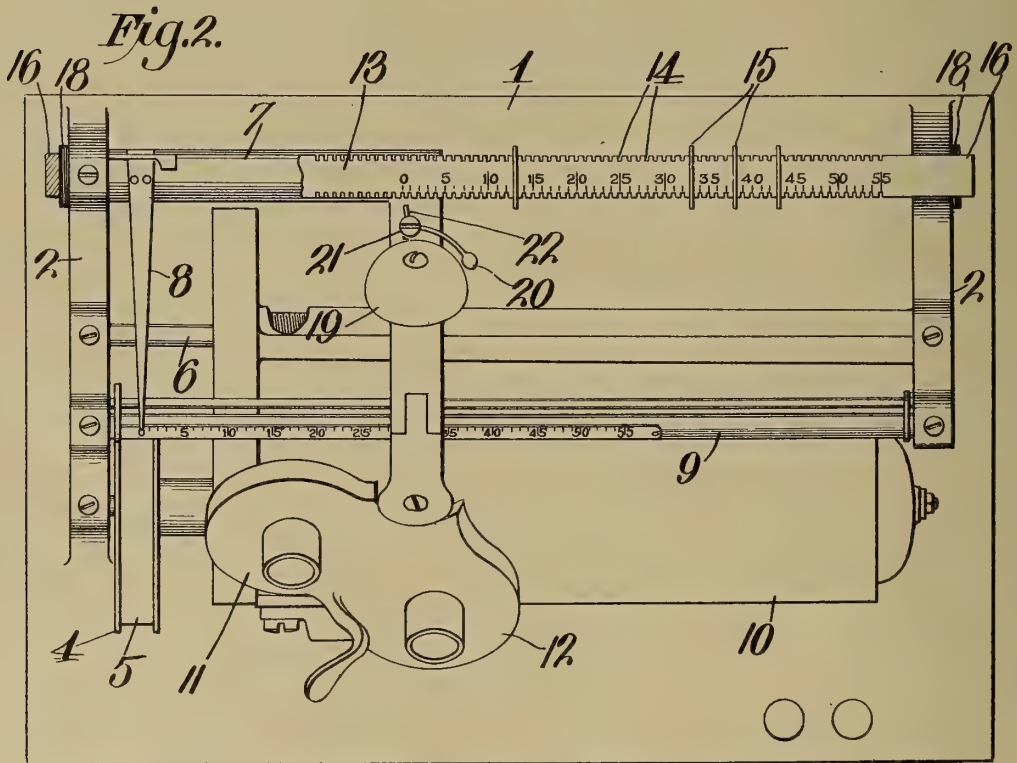
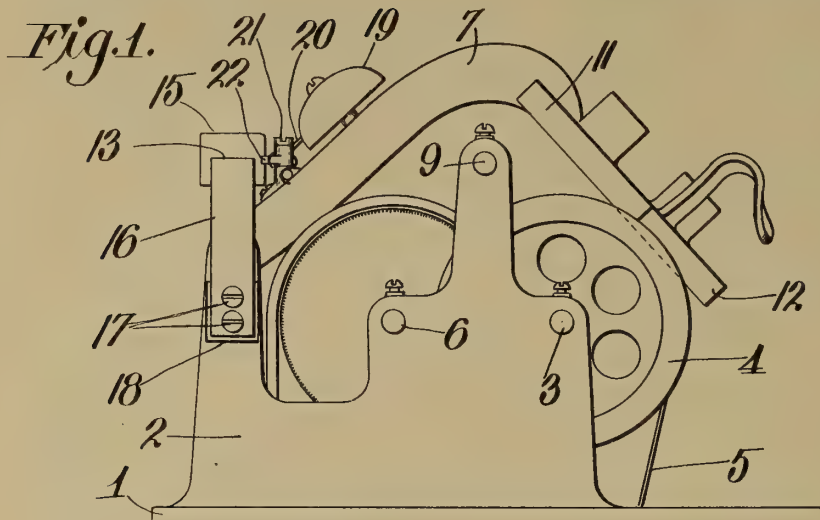


COMMERCIAL TALKING MACHINE,  
# 1,139,947-----A. A. Zaiss,  
Patented-May 18, 1915.  
Filed-May 11, 1914.

A. A. ZAISS.  
COMMERCIAL TALKING MACHINE.  
APPLICATION FILED MAY 11, 1914.

1,139,947.

Patented May 18, 1915.



WITNESSES: Frank R. Glaw, H. C. Rodgers.

INVENTOR: A. A. Zaiss

BY: George H. Sharp, ATTORNEY

*Fig. 3.*

# UNITED STATES PATENT OFFICE.

ALMA A. ZAISS, OF KANSAS CITY, MISSOURI.

COMMERCIAL TALKING-MACHINE.

1,139,947.

Specification of Letters Patent.

Patented May 18, 1915.

Application filed May 11, 1914. Serial No. 837,793.

*To all whom it may concern:*

Be it known that I, ALMA A. ZAISS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Commercial Talking-Machines, of which the following is a specification.

This invention relates to talking machines of that class known generally as dictating machines or commercial phonographs, and has for its object to produce means to be used upon such a machine, when used for transcribing purposes, for the purpose of indicating to the typist the point at which an error appears on the record cylinder, so that she may "listen" at that point and then make the required correction, it being noted in this connection that the preferred signal will be an audible signal, but that, in any event, it shall be of such character that there will be no necessity for the typist to glance at the talking machine while transcribing therefrom, it being obvious that the necessity for frequently glancing at the talking machine or an index sheet is troublesome and, of course, results in diminishing the amount of work turned out.

At present it is customary for the dictator to have handy, when dictating, an index sheet marked to correspond with the scale on the dictating machine, by preference, so that when an error is made its point on the scale of the machine is noted and the dictator makes a mark at the corresponding point on the index sheet or its equivalent. When the record cylinder is turned over to the transcriber, the index referred to accompanies it so that the transcriber may ascertain, by inspection of the index, just where errors have been made and then use the reproducer to ascertain what correction is to be made at any particular point, and in transcribing it is necessary for the typist, as hereinbefore stated, to keep close watch on the index sheet and the index finger of the machine, to avoid the necessity of transcribing the error and perhaps re-writing the page.

The preferred construction of my invention embodies an audible signal—such as a bell—and means for operating the signal at the point or points where an error or errors occur, the audible signal thus saving the typist the annoyance of repeatedly glancing away from her typewriter to the index finger

and index sheet containing the marks made thereon by the dictator.

With the object named in view, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed; and, in order that it may be fully understood, reference is to be had to the accompanying drawing, in which:—

Figure 1, is an end view of a part of a commercial talking machine embodying my invention. Fig. 2, is a top plan view of the same. Fig. 3, is a fragmentary view showing an electrically operated bell, as distinguished from the mechanically operated bell of the preceding figures.

In the said drawing, 1 indicates the base plate of a talking machine, 2 end standards thereof, and 3 the shaft for the belt wheel 4, driven by belt 5 from the motor, not shown. The usual gearing transmits power from the belt wheel to the screw 6, mounted in standards 2, and actuated to travel in the customary manner by said screw is the usual carriage 7, having an index finger 8 to travel along the scale bar 9 adjacent to the record cylinder 10, the carriage being equipped with the usual recorder 11 and reproducer 12, the latter being the element which, of course, is used by the transcriber. Other features of the ordinary talking machine are omitted as not necessary to assist in a proper understanding of the construction and operation of my invention, which, as hereinbefore stated, is for the sole benefit of the transcriber. Of course, where the same machine is used for both dictating and transcribing, it will be provided with my invention and the stops hereinafter mentioned can be placed by the typist to indicate the points where errors occur.

Referring now to the invention in detail, 13 is a bar paralleling the travel of the carriage and provided in its opposite edges with notches 14 spaced apart in accordance with the spaces on the scale bar 9, and said bar 13 is scaled to correspond with said scale bar 9. The bar 13 for all intents and purposes corresponds to the tabular stop bar or rod of a typewriting machine, and is equipped with a suitable number of adjustable stops 15, known as tabular stops when used on a typewriting machine. These stops are of inverted U-shape, as shown in Fig. 1, so that their legs may be fitted through opposite notches 14 and their top portions rest



upon the bar 13, from which position they cannot be dislodged except by pulling them directly upward.

Bar 13 is preferably provided with depending legs 16, which fit against the standards 2 and are secured thereto by screw bolts 17, and when the signal is to be operated electrically, it is preferred to insulate the bar 13 from the frame of the machine by the use of pieces of insulation as at 18, properly arranged between the standards 2 and the legs 16 of the bar. When the bell is mechanically operated the insulation pieces 18, of course, perform no function.

At a convenient point of the carriage, preferably on the arm which carries the recorder and reproducer, a bell 19 is mounted, and secured adjacent to the bell is a spring-clapper 20 on a pin 21, the clapper having an arm 22 so proportioned and arranged that in passing one of the stops 15, it will be pivotally operated slightly to withdraw the clapper, the latter instantly striking the bell as the arm 22 passes clear of the stop, and in this connection it will be noticed that the arm 22 of the bell clapper is disposed opposite the zero point on the scale of the bar 13 when the index finger 8 is at the corresponding point on the scale bar 9. Assuming that the dictator, in producing a record on a cylinder, makes errors at points corresponding to the notches 13, 33, 38, 40 and 43, of scale bar 13, he will check the points where errors have been made, on a scale or index slip or its equivalent, which will be delivered with the cylinder to the transcriber, who will place stops 15 at the said points 13, 33, 38, 40 and 43, on the scale bar 13 of her machine. In transcribing the records from the machine,—which may be at any convenient point,—the typist pays no attention to the talking machine until apprised by the ringing of the said bell that it is necessary to ascertain what correction has been made in the record.

A more accurate error indicator than that described is shown by Fig. 3, in which case the bell 19 is adapted to be operated by the energization and deenergization of an electro-magnet 23, the magnet being energized by the engagement of a contact 24 with a stop 15, mounted on bar 13, the drawing indicating electric wires 25 and 26, electrically connected to the magnet and to the bar 13, and leading from a suitable source of electric current supply, such as a battery, not shown. If desired, the wires 25 and 26 may be tapped into the wires, not shown, for supplying the current necessary to operate the motor, hereinbefore mentioned. With this electric bell, it will be apparent that the instant the contact 24 engages a stop 15 the signal will be sounded, and in this connection it is desired to state that a bell which will sound only once is preferred to the or-

dinary electric bell, as a continual ringing of the latter would be annoying to the transcriber.

From the above description it will be apparent that I have produced a commercial talking machine, which embodies the features of advantage enumerated as desirable, and which may be modified in many particulars without departing from the spirit and scope or sacrificing any of the advantages of the appended claims, it being obvious, of course, that the invention is susceptible of use with all types of talking machines.

I claim:—

1. The combination with a talking machine having a traveling carriage, of a signal mechanism adapted to be automatically operated at one or more predetermined changeable points in a single travel of the carriage without interfering with the travel of the latter.

2. The combination with a talking machine having a traveling carriage, of a signal, and adjustable means adapted to be actuated by the carriage in its travel, to operate the signaling device without interfering with the travel of the carriage.

3. The combination with a talking machine having a traveling carriage, of a scale and a signal, one of said elements being stationary and the other movable with the said carriage, and means adjustable along the scale for effecting the operation of the signal at a particular but changeable point in the travel of said carriage without interfering with the travel of the latter.

4. The combination with a talking machine having a traveling carriage, of a scale bar, one or more devices adjustable with respect to the scale bar, means for engagement with said device or devices at points in the travel of the carriage corresponding to the positions of the said device or devices with respect to the scale bar, and a signaling device for automatic operation through such engagement.

5. The combination with a talking machine having a traveling carriage, of a scale bar, one or more devices adjustable with respect to the scale bar, means for engagement with said device or devices, the said bar and device-engaging means having relative movement whereby the latter and the device or devices are caused to engage at a predetermined changeable point or points, through the travel of the carriage, and a signal to be automatically operated whenever such engagement occurs.

6. The combination with a talking machine embodying a suitable frame and having a traveling carriage on said frame, of a scale bar secured to the machine frame, a device adjustable along said scale bar, a signal mechanism, and means mounted on the carriage and adapted during and with-

out interfering with the travel of the latter to engage said device and be caused, through such engagement, to operate the signal mechanism.

5 7. The combination with a talking machine embodying a suitable frame and having a traveling carriage on said frame, of a scale bar secured to the frame of the machine, a stop or stops adjustable on the  
10 bar, a signal mounted on the carriage, and means also mounted on the carriage and adapted to engage said stop or stops and be caused, through such engagement, to operate the signal.

8. The combination of a talking machine 15 having a traveling carriage, a stationary scale bar, a stop adjustable on the scale bar, a bell mounted on the carriage, and a bell clapper mounted on the carriage and adapted to be operated by said stop in passing the  
20 same, to strike the bell.

In testimony whereof, I affix my signature, in the presence of two witnesses.

ALMA A. ZAISS.

Witnesses:

H. C. RODGERS,  
G. Y. THORPE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





STOP FOR TONE ARMS OF TALKING MACHINES,  
# 1,141,037-----G. Busch,  
Patented-May 25, 1915.  
Filed-August 10, 1914.

G. BUSCH.  
STOP FOR TONE ARMS OF TALKING MACHINES.  
APPLICATION FILED AUG. 10, 1914.

1,141,037.

Patented May 25, 1915.

Fig. 1.

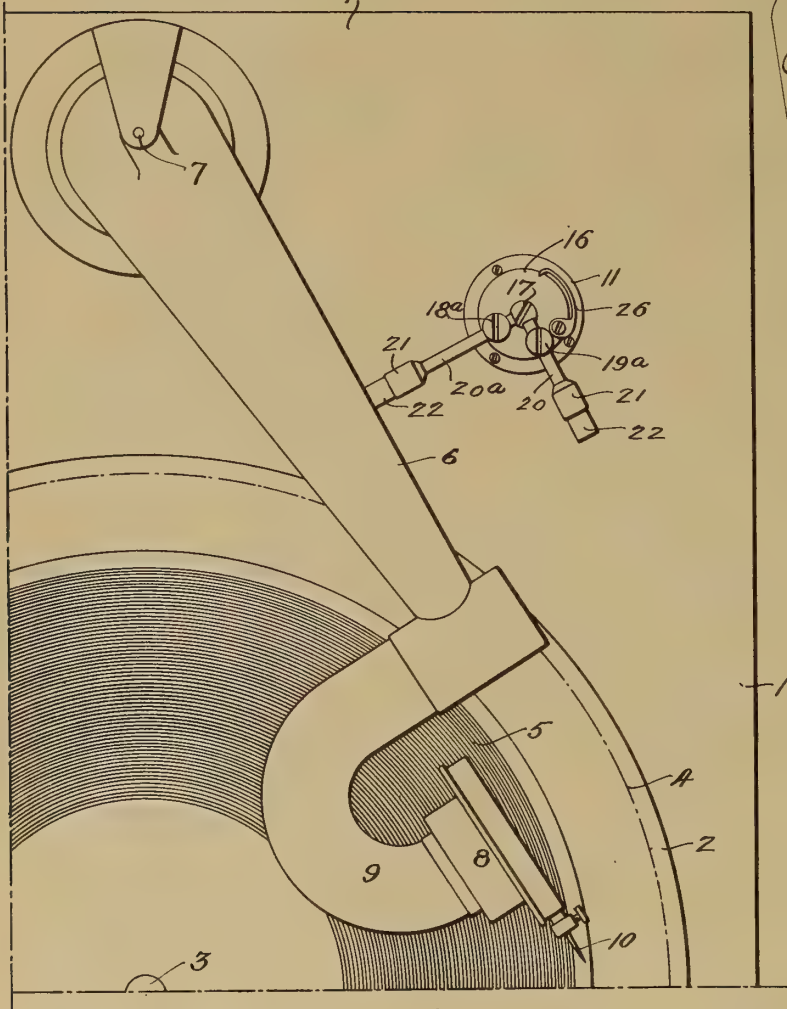


Fig. 2.

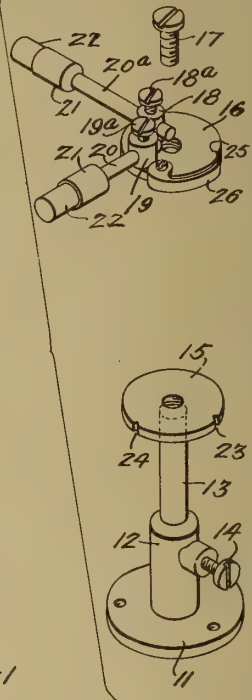


Fig. 3.

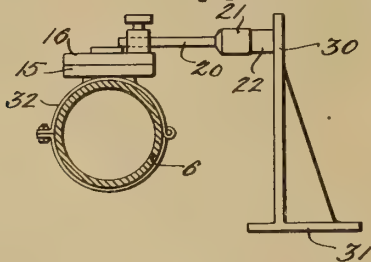
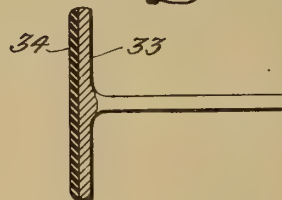


Fig. 4.



Witnesses:-  
Walter Chism  
Walter Pullinger

Inventor:  
Gerhard Busch,  
by his Attorneys.  
Howson + Howson

# UNITED STATES PATENT OFFICE.

GERHARD BUSCH, OF PHILADELPHIA, PENNSYLVANIA.

STOP FOR TONE-ARMS OF TALKING-MACHINES.

1,141,037.

Specification of Letters Patent.

Patented May 25, 1915.

Application filed August 10, 1914. Serial No. 856,019.

*To all whom it may concern:*

Be it known that I, GERHARD BUSCH, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Stops for Tone-Arms of Talking-Machines, of which the following is a specification.

One object of this invention is to provide a relatively simple, inexpensive and conveniently operated device for limiting the movement of the tone arm of a talking machine relatively to a record disk on the rotary plate or table thereof in order that said arm may be prevented from moving beyond that point at which the reproducer needle, carried by the sound box on said arm, will strike said disk immediately adjacent the beginning of the record thereon.

A further object of the invention is to provide a stop which will limit the movement of the tone arm to such a point as will cause the reproducer needle carried thereby to engage the record disk between the edge and the beginning of the record groove with a view to preventing the sound box being moved into a position in which the needle may drop beyond the edge of the record, as well as to avoid the loss of time otherwise incidental in properly starting the talking machine.

The invention also contemplates a novel form of a stop for the tone arm of the talking machine which shall be adjustable to cause it to properly position such arm for records of a number of different diameters and that regardless of whether said tone arm is movable solely in a horizontal plane or whether it is moved in both horizontal and vertical planes while being brought to a position in which the machine is ready for operation.

Another object of the invention is to provide a device of the character described which in addition to being adjustable to suit it to tone arms of various heights above the surface of the talking machine casing, shall also include means whereby its arm-engaging abutment or abutments may be conveniently adjustable to cause them to stop such arm with the reproducer needle in the desired position relatively to a record disk.

These objects and other advantageous ends I secure as hereinafter set forth, reference being had to the accompanying drawings in which:—

Figure 1 is a plan of a portion of a talk-

ing machine showing my invention as applied thereto; Fig. 2 is a detached perspective view of certain of the parts of my invention; Fig. 3 is a side elevation of a slightly modified form of my stop, and Fig. 4 is a side elevation of a special form of arm engaging member.

In the above drawings 1 represents the top of the casing of a talking machine of the well known form upon which is mounted a rotary plate 2, driven from a vertical spindle 3 in the ordinary manner. On this plate may be placed record disks of any diameter, the customary sizes being either twelve inch or ten inch disks, as illustrated at 4 and 5 respectively. The tone arm of the machine is indicated at 6 and in the present case is shown as mounted on a vertical pivot 7 so as to swing in a substantially horizontal plane, the sound box 8 being attached to the free end of said arm through a goose-neck 9. Said sound box is provided with a record engaging needle or point 10 and my invention is designed to insure that, when the tone arm is swung outwardly prior to bringing the needle into engagement with the record, said arm shall be stopped at the exact position necessary to cause the point of the needle 10 to engage the record 5 for example, at some point between its edge and the beginning of the record groove in its surface. For this purpose I mount on the top surface of the machine casing adjacent the plate 2 a small base 11, having a socket 12 for the reception of a vertically extending rod 13, which may be adjustably clamped in place by a set screw 14. On the upper end of the standard so formed is fixed a circular or other suitably shaped plate 15 upon which is rotatably mounted a second plate or disk 16 held in place by a pivot screw 17.

In the present case I have illustrated my invention as designed for use in limiting the tone arm to either of two outer positions in which its sound box point or needle will be properly positioned on a ten or twelve inch record, as the case may be and I therefore mount on the top surface of the plate 16, two binding posts 18 and 19, which are provided with clamping screws 18<sup>a</sup> and 19<sup>a</sup> respectively. In said binding posts are adjustably mounted two small horizontally projecting rods 20 and 20<sup>a</sup> each having a cupped head 21 in which is mounted a rubber or other suitable buffer 22, the arrange-



ment being such that each of said rods may be adjusted longitudinally through its binding post and thereafter clamped in any given position by the screw of said post.

5 The plate or disk 15 in the present case is provided with two vertical notches 23 and 24, formed in its edge at points 90° distant from each other, and the disk 16 likewise has a similar vertical notch 25, there being  
10 fixed to the edge of this latter disk a spring pawl 26, hooked at its free end so as to normally extend into the notch 25. The width of this hooked end is such that it extends below the plane of the bottom face of the  
15 disk 16 and when the parts are assembled, is free to enter either of the notches 23 or 24. The adjacent ends of the two notches 23 and 24 are slightly beveled or curved so that when a sufficient rotary force is exerted,  
20 the plate 16 is turned, whereupon one of these beveled or curved edges will act on the hooked end of the pawl 26 to raise it out of the notch 25 as well as that one of the notches in the plate 15 which may have been  
25 in line with the same. The plate 16 may then be freely turned until the second notch comes under the hooked end of the pawl which will at once enter it and hold the plates from relative movement until the  
30 plate 16 is again forcibly turned.

In using the device, the base 11 is permanently fixed to the top of the casing 1 in or adjacent the position shown in Fig. 1 relatively to the tone arm and record supporting plate, and the post 13 is thereafter adjusted vertically so as to bring the center line of the bars 20 and 20<sup>a</sup> supported by the two binding posts, into the same horizontal plane as that of the tone arm 6. This latter  
40 is then brought to a position in which, when the sound box is lowered, the needle 10 engages the ten inch record 5 at some point on the narrow annular surface between its periphery and the beginning of its record  
45 groove, after which the longer of the two arms 20 and 20<sup>a</sup>, *i. e.*, that belonging to the binding post 18, is moved outwardly until its rubber end portion or buffer engages the tone arm, whereupon the set screw 19<sup>a</sup> is  
50 tightened. The plate 16 is then turned on its pivot screw 17 through an angle of substantially 90°, thus bringing the stop rod 20 into a line perpendicular with the center line of the tone arm, which is then moved  
55 to a position in which the needle or reproducer point 10, engages the narrow annular edge portion of the twelve inch record 4, between its edge and the beginning of the record groove thereon. Thereafter this second rod is moved longitudinally through its binding post until it engages the tone arm, when its screw 19<sup>a</sup> is tightened to clamp it rigidly in position.

65 If now the machine is to be used with twelve inch records, it is only necessary in

order to place it in operation that the tone arm be swung outwardly until it engages the buffer 22 on the rod 20 carried on the binding post 19. Thereafter the goose-neck 9 may be rotated in its bearing to lower the  
70 sound box 8, and by reason of the above noted positioning operation, the needle 10 will engage the disk 4 in a position ready to enter the record groove thereof, but without the possibility of moving outwardly off  
75 of the edge.

When it is desired to use the machine with ten inch records, the plate 16 is turned on its pivot screw 17, thus bringing the longer bar or rod 20 into position to be engaged  
80 by the tone arm, when this is swung outwardly. When it stops, the sound box 8 may be lowered, and as before the needle or reproducer point 10 will engage the disk at some point between its edge and the beginning of the record groove. In any case  
85 it is a practical impossibility for the sound box to be lowered so that the needle will fall beyond the edge of the record disk with consequent possible injury. When the plate 16  
90 is turned to bring one or the other of the bars 20 or 20<sup>a</sup> into operative position, the hooked end of the spring 26 is forced out of that one of the notches 23 and 24 in which it was resting and rides over the curved edge  
95 of said plate until it finally drops into the other one of these notches and into the notch 25 of the plate 16, thus locking one of said rods in working position ready to limit the movement of the tone arm. 100

Obviously the adjustable stop rods 20 or 20<sup>a</sup> may be mounted on the tone arm itself, in which case, as shown in Fig. 3, I mount  
105 on the top of the casing 1 a vertical standard 30, carried by a base 31, fixed to said top. As before, the rod or rods 20 and 20<sup>a</sup> are adjustably carried on a rotatable plate 16, pivoted concentrically with the second plate or disk 15 which in this case would be clamped  
110 to the tone arm 6 by any suitable form of band clamp 32. When the tone arm is swung on its pivot, that one of the rods 20 which projects at right angles thereto will cooperate with the standard 30 to limit the  
115 position of the sound box as previously described and therefore also the position of the needle or point 10.

In those forms of talking machines in which the tone arm is vertically movable as well as free to swing in a horizontal plane,  
120 I preferably make each of the tone arm limiting rods as shown in Fig. 4. In this construction the outer end of each rod is vertically elongated both above and below its center line as indicated at 33 and is provided with a leather, rubber or other relatively soft facing 34. With this construction the tone arm is engaged and its movement limited when it is swung outwardly  
125 so, that by the time the sound box is lowered 130

into its operative position, the needle or point 10 is brought into engagement with the record disk at the desired point.

I claim:—

5 1. A new article of manufacture consisting of a standard; a rotary member thereon; a plurality of arms projecting different distances from said member; with a pawl carried by the standard in position to engage  
10 the rotary member for temporarily locking it in any of a number of different positions.

2. A new article of manufacture consisting of a standard; a plate fixed thereon; a second plate parallel with the first plate and  
15 free to rotate relatively thereto; a plurality of binding posts carried by the second plate; with arms mounted in said binding posts and projecting different distances at right angles to the standard.

20 3. A new article of manufacture consisting of a standard; a plate fixed thereon; a second plate parallel with the first plate and free to rotate relatively thereto; a plurality of binding posts carried by the second plate;

arms mounted in said binding posts and pro- 25  
jecting different distances at right angles to the standard; and a spring actuated pawl carried by one of the plates and formed to cooperate with any of a plurality of notches  
30 in the other plate to temporarily lock the arms in different positions relatively to the standard.

4. A new article of manufacture consisting of a supporting structure; a plate rotatable thereon; arms projecting from said  
35 plate in lines substantially at right angles to the axis of rotation thereof; buffers respectively carried by said arms; and a pawl mounted on the supporting structure in position to engage and hold the plate in any  
40 of a plurality of definite positions.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GERHARD BUSCH.

Witnesses:

AUGUSTUS B. COPPES,  
JOS. H. KLEIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





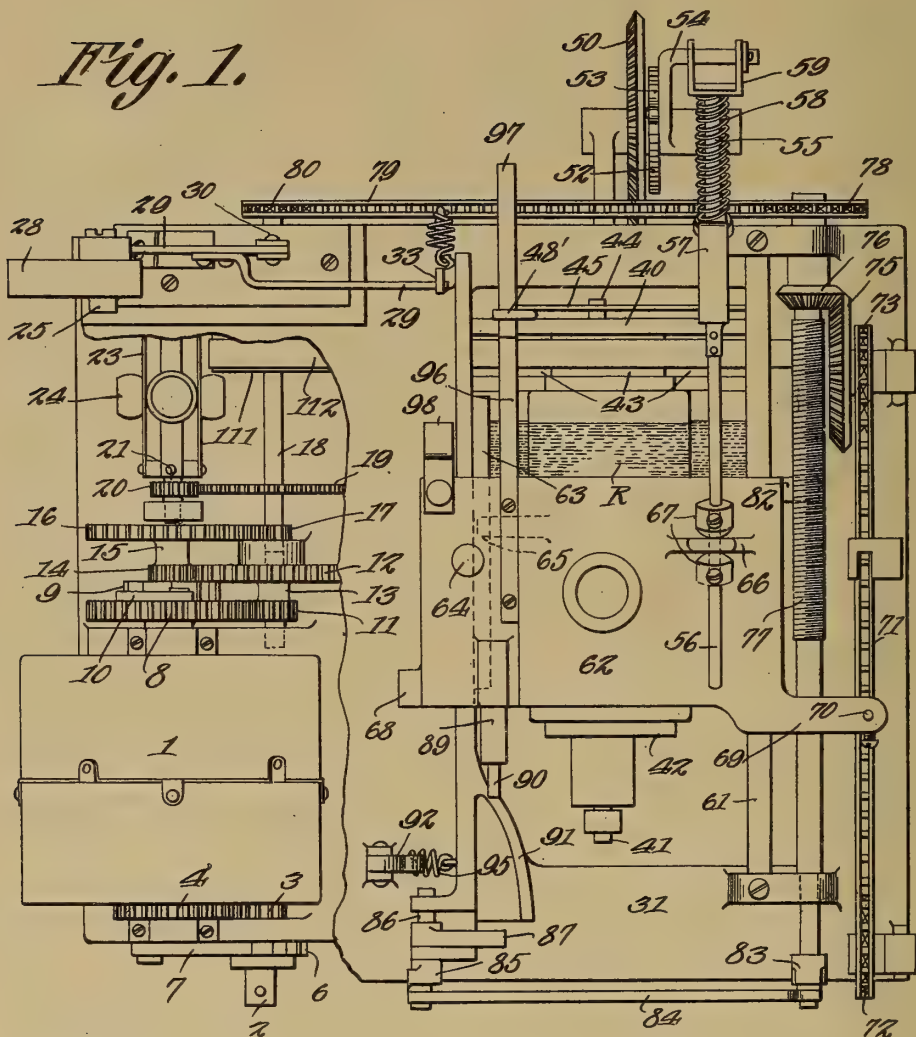
MULTIPLE RECORD PHONOGRAPH,  
# 1,141,232-----W. E. Childers,  
Patented-June 1, 1915.  
Filed-June 9, 1914.

W. E. CHILDERS.  
 MULTIPLE RECORD PHONOGRAPH.  
 APPLICATION FILED JUNE 9, 1914.

1,141,232.

Patented June 1, 1915.

5 SHEETS—SHEET 1.



Witnesses

*J. R. Tomlin*  
*M. E. McElrath*

*Walter E. Childers*

Inventor,

by *C. A. Snow & Co.*  
 Attorneys.



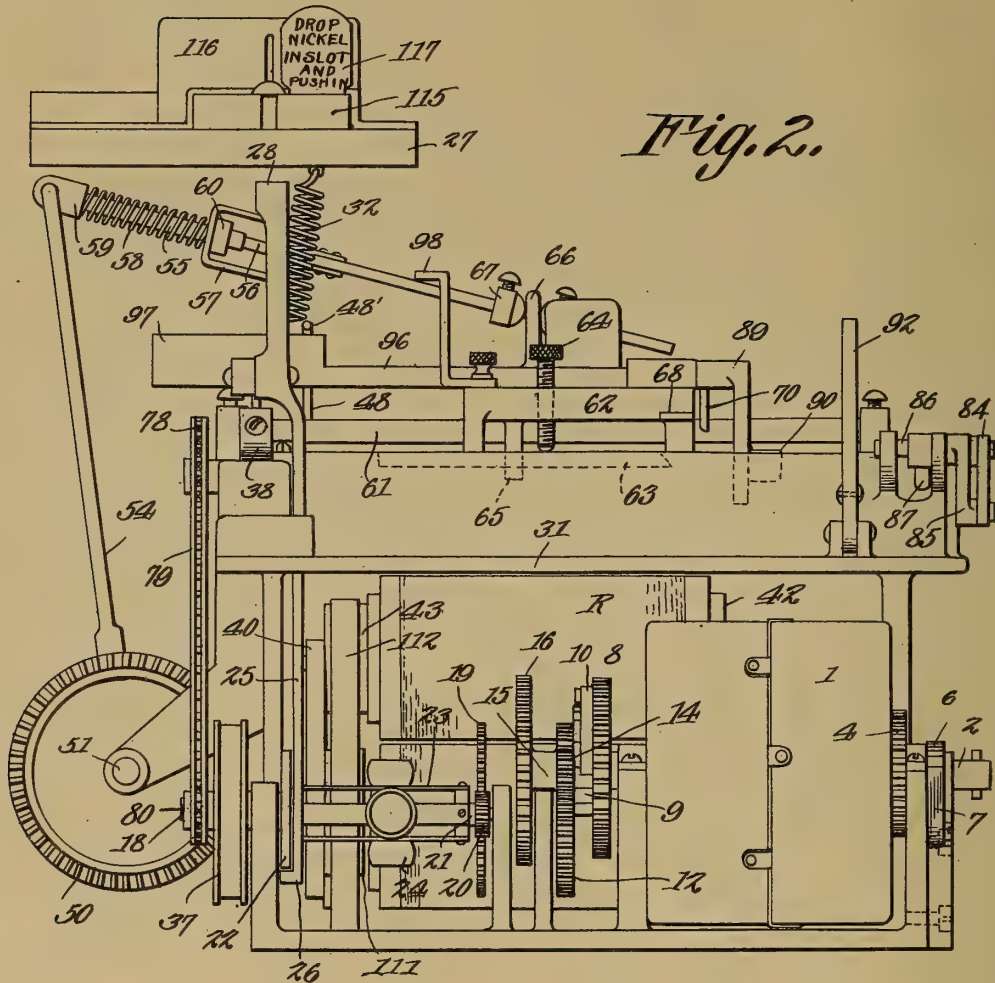


W. E. CHILDERS.  
 MULTIPLE RECORD PHONOGRAPH.  
 APPLICATION FILED JUNE 9, 1914.

1,141,232.

Patented June 1, 1915.

5 SHEETS—SHEET 2.



Walter E. Childers

Inventor

Witnesses

*J. R. Tomlin*  
*M. E. McCarthy*

by

*C. A. Snow & Co.*

Attorneys.



**1,141,232.**

5 SHEETS—SHEET 3.

[illegible]

## Witnesses

J. R. Lorne  
M. E. & C. Barth

Inventor

by *C. A. Now & Co.*  
Attorneys.





W. E. CHILDERS.  
 MULTIPLE RECORD PHONOGRAPH.  
 APPLICATION FILED JUNE 9, 1914.

1,141,232.

Patented June 1, 1915.  
 5 SHEETS—SHEET 4.

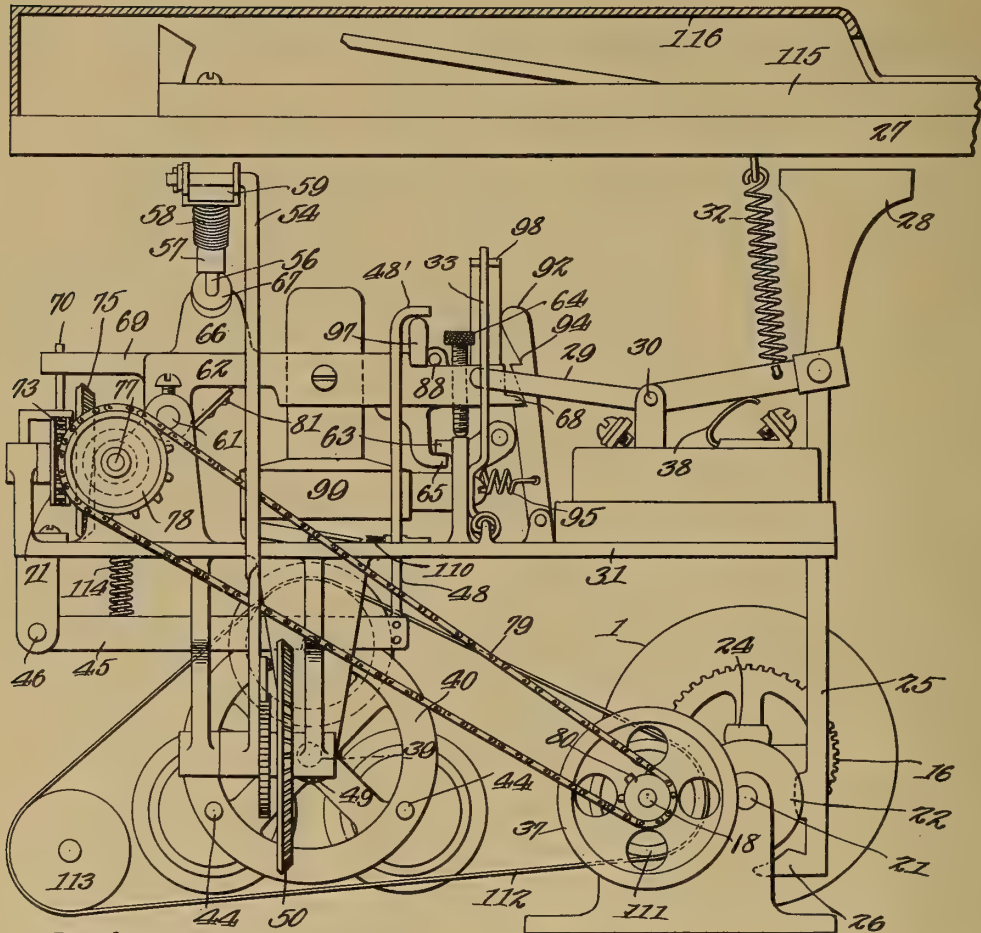


Fig. 4.

Witnesses

*J. R. Dineen*  
*W. E. Childers*

Walter E. Childers

Inventor

by

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W. E. CHILDERS.  
 MULTIPLE RECORD PHONOGRAPH.  
 APPLICATION FILED JUNE 9, 1914.

1,141,232.

Patented June 1, 1915.

5 SHEETS—SHEET 5.

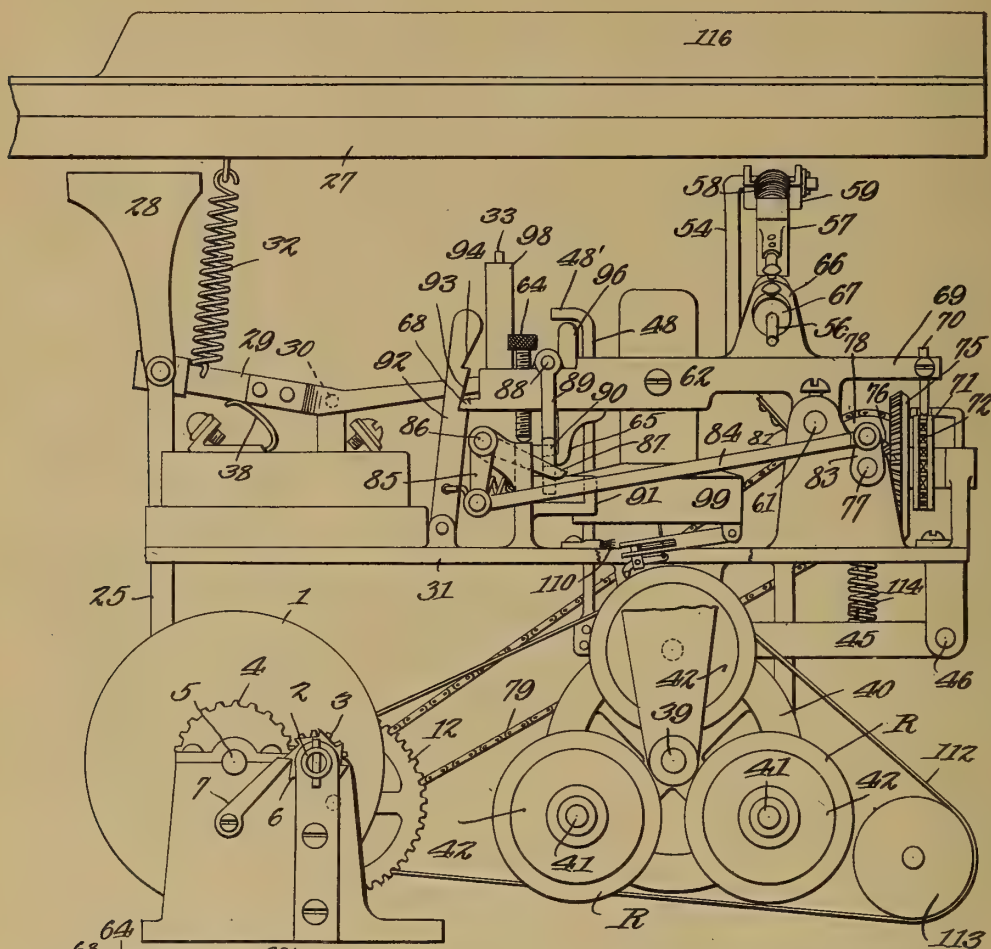


Fig. 5.

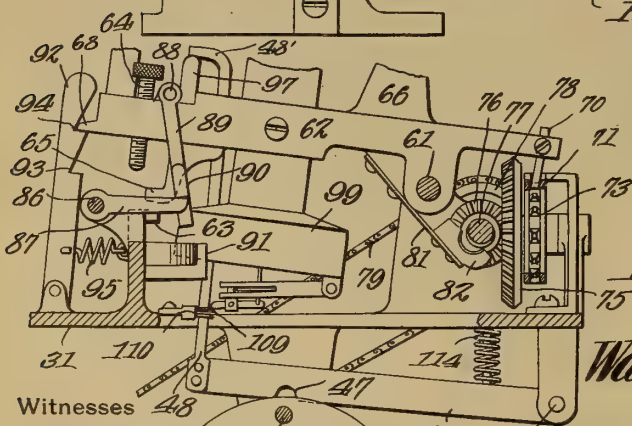


Fig. 6.

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Witnesses

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# UNITED STATES PATENT OFFICE.

WALTER EDGAR CHILDERS, OF MERTZON, TEXAS.

## MULTIPLE-RECORD PHONOGRAPH.

1,141,232.

Specification of Letters Patent.

Patented June 1, 1915.

Application filed June 9, 1914. Serial No. 844,052.

*To all whom it may concern:*

Be it known that I, WALTER EDGAR CHILDERS, a citizen of the United States, residing at Mertzon, in the county of Irion and State of Texas, have invented a new and useful Multiple-Record Phonograph, of which the following is a specification.

This invention relates to multiple record phonographs, one of its objects being to provide improved means whereby record cylinders, which are arranged in a cluster or group, are brought successively into operative relation with driving mechanism whereby said records are caused successively to rotate, the means employed for actuating the records being simple and efficient.

A further object is to provide a machine of this character utilizing a carriage to which the reproducer is connected, said carriage having means for feeding it longitudinally of the rotating record and, when the reproducer reaches the end of the record, means are provided whereby the carriage is disengaged from its feeding means and is automatically returned to its starting point.

A further object is to provide means whereby the carriage can be locked upon reaching its starting point, or, if desired, can be caused to again travel as before, the mechanism for rotating the cluster or group of records being so timed as to bring a new record to active position each time the carriage is returned to its normal or initial position.

Another object is to provide means whereby the stylus of the reproducer is cleaned of all accumulations of dust, etc., during the return of the carriage to its initial or starting position.

A further object is to provide a novel form of reproducer whereby the use of a cleaning means is made possible.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings: Figure 1 is a top plan view of the machine, parts being broken away. Fig. 2 is a front elevation. Fig. 3 is a rear elevation. Fig. 4 is an elevation of one side of the machine. Fig. 5 is an elevation showing the other side of the machine. Fig. 6 is a section of a portion of the structure, the carriage being shown in end elevation and elevated at the beginning of its return movement. Fig. 7 is a section through a portion of the reproducer. Fig. 8 is a section on line C—D Fig. 7.

Referring to the figures by characters of reference, 1 designates a spring motor of any suitable form which can be wound in the usual or any preferred manner, this motor having the usual key engaging spindle 2 from which motion is transmitted, through a gear 3, to a gear 4 secured to the shaft 5 of the motor. Spindle 2 has a ratchet 6 and a pawl 7 for holding it against rotation in one direction. The motor drives a gear 8, it being connected thereto by a ratchet wheel 9 which is secured to the motor shaft and a pawl 10 which is secured to the gear 8. Gear 8 meshes with a gear 11 arranged on a sleeve with a large gear 12, the sleeve on which the two gears 11 and 12 are secured, being indicated at 13. The gear 12 meshes with a small gear 14 secured to a sleeve 15 which is mounted for rotation on the motor shaft and has a large gear 16 secured thereto. This large gear meshes with a smaller gear 17 secured to a shaft 18 on which the sleeve 13 is mounted for rotation. Another gear 19 is secured to the shaft 18 and meshes with a small gear 20 secured to the shaft 21 of the governor mechanism, this governor being of the usual centrifugal type utilizing a slidable disk 22 connected to spring strips 23 carrying balls 24 adapted to be thrown outwardly by centrifugal force, thus to shift the disk 22 into engagement with a brake arm 25. In the present instance this brake arm is shown provided at its lower end, with a shoe 26 extending under the disk 22 so that, when the arm 25 is drawn upwardly, the said shoe will engage the periphery of the disk and thus stop the rotation of the disk and governor mechanism. The said arm 25 is extended upwardly to a point close to and under the top 27 of the casing in which the mechanism is housed, the upper end of the arm being enlarged to form a head 28. The arm is pivotally connected, at an intermediate point, to a lever 29 ful-



crumed, as at 30, upon the supporting frame 31 of the mechanism and a spring 32 connects the lever to the top 27 so as thus to hold arm 25 normally raised and with the shoe 26 in contact with the disk 22. The free end of the lever 29 works along one edge of an upstanding latch 33 which, as shown in the drawings, has a notch 34 forming a shoulder 35 on which the lever 29 is adapted to rest while the spring 32 is under stress and the head 28 is in its lowermost position, thus holding the brake shoe 26 out of contact with the disk 22. Latch 33 is also provided with another notch 36 near its upper end and which is for the purpose hereinafter set forth.

Shaft 18 is provided with a pulley 37 whereby motion may be transmitted thereto through a suitable belt, not shown, from an electric motor, not shown, and, when an electric motor is used for driving the mechanism, it will be seen that the pawl 10 will slip over the ratchet 9 so that the spring motor 1 will not resist the operation of the electric motor. Furthermore when an electric motor is used, a spring contact 38 is arranged under lever 29 and is arranged in the circuit extending to the motor. The lever 29 is also arranged in said circuit. When the said lever 29 is pressed downwardly to the position shown in the drawings, so as to come against spring 38, a circuit will be established to the motor but, as soon as the lever 29 is released and caused to move upwardly under the action of spring 32, contact with the spring 38 will be broken and the circuit to the motor will be likewise broken. It is of course to be understood that where an electric motor is used, that portion of the lever 29 above the spring 38 will be insulated from the remaining portion of the machine. This can be done in any well known manner.

Journalled in suitable bearings provided therefor is a transverse shaft 39 to which is secured a head 40 having spindles 41 fixedly connected thereto and extending from one side thereof, these spindles being parallel with the shaft 39. Each spindle has a mandrel 42 mounted for rotation thereon and each mandrel is provided at that end nearest the head 40 with an integral pulley 43. Each mandrel is adapted to hold one record cylinder R and it is to be understood that the number of records carried by the head 40 is dependent upon the number of mandrels used and this number is only limited by the size of the head 40. Each of the spindles 41 has a short extension 44 projecting from the head and these projections are disposed under and are adapted successively to engage a locking lever 45 pivotally mounted as at 46 and having a notch 47 adapted to receive any one of the projections 44. An arm 48 extends up-

wardly from the locking lever and is provided, at its upper end, with a laterally extending finger 48' for the purpose herein-after set forth. A gear 49 is secured to and rotates with the shaft 39 and constantly meshes with a large gear 50 secured to a shaft 51. A ratchet wheel 52 is also secured to shaft 51 and is adapted to be intermittently rotated by a pawl 53 carried by a lever 54 which is pivotally mounted on the shaft 51 and is pivotally connected, at its upper end, to one end of a sleeve 55 which is slidably mounted on an actuating rod 56. This sleeve is slidably mounted within a guide loop 57 secured to the rod 56 and a coiled spring 58 is mounted on the sleeve and bears at one end against the loop 57 and at its other end against an enlargement 59 at one end of the sleeve. A collar 60 is provided for preventing the sleeve 55 from pulling out of the loop 57 and for holding the spring 58 under compression. It will be seen that spring 58 thus constitutes a cushion to permit relative movement of the rod 56 and the sleeve 55.

Supported by the frame 31 is a guide rod 61 on which a carriage 62 is mounted to slide and to rock. This guide rod 61 is parallel with a rail 63 and the carriage has a supporting screw 64 designed to slide along the rail 63 so that said rail and the rod 61 thus cooperate to hold the carriage in its normal or active position as, during the reproduction of sound from one of the records. The rail 63 does not extend throughout the length of the path of movement of the carriage, but terminates short thereof. A finger 65 extends downwardly from the carriage and is adapted to travel under the rail, thus to prevent the screw 64 from lifting off of the rail. When, however, the carriage reaches either limit of its movement, the finger will be brought to position beyond one end or the other of the rail 63, thus to permit swinging movement of the carriage relative to the rail and about the rod 61.

The carriage has an ear 66 upstanding therefrom and the rod 56 extends loosely through this ear. Collars 67 are secured on the rod 56 and are disposed at opposite sides of the ear, these collars serving to prevent longitudinal movement of the rod 56 independently of the carriage.

A lip 68 extends from the carriage adjacent that end thereof remote from shaft 51 and an arm 69 extends from the carriage adjacent said end, this lip and the arm being located at opposite sides of the carriage. A coupling pin 70 extends downwardly from arm 69 and when the carriage is in its normal or active position, with screw 64 bearing downwardly on rail 63, this pin 70 is disposed above and out of engagement with the upper flight of an endless chain 71 which, as shown in the drawings, is mount-



ed upon sprockets 72 and 73 and extends parallel with the rod 61. Sprocket 73 is secured to a small shaft 74 on which is secured a bevel gear 75, this bevel gear meshing with a smaller bevel gear 76 secured to a feed screw 77 which is parallel with the rod 61 and is located back of but adjacent the carriage 62. This feed screw has a sprocket 78 which receives motion, through a chain 79, from a sprocket 80 secured to the shaft 18.

A spring strip 81 is attached to and extends from the carriage 62 and carries a feed block 82 which, when the carriage is in its normal or active position, bears upwardly against and engages the feed screw 77. The parts are so proportioned, however, that when the carriage is tilted upwardly out of normal position and about the rod 61, the block 82 will move downwardly out of engagement with the screw 77. At the same time, the pin 70 will move downwardly into engagement with the chain 71.

The feed screw 77 is provided, at one end, with a crank arm 83 and a pitman 84 connects this crank arm to an arm 85 extending downwardly from a short rock shaft 86 journaled adjacent the rail 63. This rock shaft carries a lifting finger 87 and the arm 85 and crank arm 83 are so proportioned that, during the rotation of the crank arm 83, the arm 85 and the lifting finger 87 will be oscillated.

A shaft 88 is mounted for rotation on the carriage 62 at that end thereof adjacent the lip 68 and depending from this shaft is a hanger 89 provided, at an intermediate point, with an outstanding wing 90. A stationary cam 91 is located in the path of the lower end portion of the hanger 89 so that, as the carriage approaches one limit of its movement, during the reproduction of sound, the lower end of the hanger 89 will come against the cam 91 and be deflected laterally, thus to shift the wing 90 out of the path of the oscillating lifting finger 87. Cam 90 is so proportioned, however, that just as the carriage 62 reaches one limit of its movement, the lower end of the hanger 89 will move off of the end of cam 91 and said hanger will gravitate back so as to bring the wing 90 against the end of the lifting finger 87. Thus, when the lifting finger 87 moves downwardly until its end arrives below the wing 90, said wing will swing to position directly over the finger 87 so that, when the said finger moves upwardly, the hanger 89 will push upwardly against the carriage 62 and cause the carriage to swing upwardly about the rod 61.

A supporting latch 92 is pivotally mounted adjacent the finger 87 and has superposed notches 93 and 94, this latch being held by a spring 95 so as to press yieldingly toward

the carriage 62. A lifting bar 96 is mounted on the carriage and has one end portion elevated, as shown at 97, this elevated portion being adapted to come into position under the finger 48' on the lifting arm 48 when the carriage approaches the limit of its movement while being actuated by the screw 77.

A releasing arm 98 is pivotally mounted on the carriage and is designed to move against the latch 33 when the carriage is returned to its initial position, thus to actuate said latch and release lever 29 from the shoulder 35. Notch 36 is so located as to receive the upper end of the arm 98 but is of sufficient length to allow said arm to move downwardly within the notch 36 when the carriage drops down to its active position in the manner hereinafter set forth. It is to be understood that by swinging the arm 98 out of its normal position, it can be prevented from engaging the latch 33 and releasing lever 29.

A reproducer 99 is connected to the carriage 62 and has a small lever 100 connected to its frame so as to extend under the diaphragm. This lever is provided with a slot 101 and a pin 102 is mounted for rotation in the lever and extends across the slot. This pin has a crank arm 103 extending radially therefrom and pivotally engaged by one end of a plate 104 which is mounted within the slot 101. A spring 105 is secured to the plate and serves to pull continuously thereon so as thus to keep the crank arm 103 in alinement with the longitudinal center of the plate 104 under normal conditions. A large opening 106 is formed in the plate 104 and registers with corresponding openings in the lever 100. Through these openings extends a wire 107 or other flexible element which is connected to one arm of a secondary lever 108. This secondary lever is fulcrumed in the lower end portion of the pin 102 and the other arm of the secondary lever carries a stylus or reproducing needle 109. A brush extends under and parallel with the rail 63, as shown at 110, and during the reproduction of sound from a record, the lever 108 and its needle 109 travels below the brush. When, however, the carriage is being returned to its initial position while elevated, the needle or stylus 109 will be lifted to a point above the brush and will be caused to drag along the bristles of the brush so that any dust or the like adhering to the needle will be removed therefrom. By mounting lever 108 in the revoluble pin 102, the needle or stylus is permitted to swing back under the resistance to which it is subjected by the brush but, as soon as the needle passes off of the brush, the spring 105 will return the same to its initial position relative to the lever 100.

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The operation of the motor, either spring or electric has already been described. It will be apparent that during the actuation of the shaft 18, the chain 79 will continuously operate the feed screw 77 and this feed screw will, in turn, continuously oscillate the lifting finger 87 and will continuously actuate the endless chain 71. In addition to the continuous operation of the foregoing parts, a pulley 111 is secured to shaft 18 and drives an endless belt 112 which engages an idler 113 and passes under and over the pulleys 43 carried by the several mandrels 42. The belt 112 is so proportioned as to frictionally engage the uppermost pulley 43 so as to cause said pulley to rotate. Thus it will be seen that during the continuous actuation of the parts hereinbefore referred to, the uppermost pulley 43, its mandrel 42, and the record on said mandrel will also be continuously actuated. When the carriage is at the beginning of its active movement, the screw 64 rests upon the rail 63 and the finger 65 extends under the rail so as to prevent the carriage from swinging upwardly. Pin 70 is at the same time supported above and out of engagement with the chain 71. Feed block 82 also engages the screw 77. As the feed screw rotates the carriage is caused to travel slowly along the rod 61 and the rail 63, the needle 109 traveling below the brush 110 and within the groove of the rotating record. As the carriage approaches the limit of its movement the hanger 89 comes against the deflecting cam 91 and is thus shifted laterally as hereinbefore described. At the same time the elevated or enlarged portion 97 of the bar 96 is brought to position under the finger 48' and the lip 68 is brought into position within the lower notch 93 in latch 92. Just as the hanger 89 passes off of the end of cam 91 as hereinbefore described and wing 90 moves to position above the lifting finger 87, said finger, which is constantly oscillating, will push upwardly on the hanger 89 and cause the carriage 62 to swing upwardly about the rod 61. This will cause lip 68 to move from the lower notch 93 to the upper notch 94 and at the same time the pin 70 will move downwardly into engagement with the upper flight of the continuously moving chain 71. The elevated or enlarged portion 97 of bar 96 presses upwardly against finger 48' and thus causes arm 48 and lever 45 to move upwardly, thereby withdrawing the notch 47 from the projection 44 which was seated therein.

The upward swinging movement of the carriage 62 will be sufficient to lift the stylus or needle of the reproducer off of the record and to position it above the brush 110. When the pin 70 moves into engagement with the returning chain 71, the carriage is drawn back toward its initial position and the finger 65, which has been lifted past one end of the rail 63, will be guided by the lip 68 riding in notch 94, onto the top of the rail 63. Thus the carriage will slide back to its initial position, the elevated portion 97 of bar 96 holding the lever 45 elevated during a portion of its return movement or until the elevated portion 97 passes from under the finger 48'. During the movement of the carriage back to its initial position, the ear 66 presses against rod 56 and through spring 58 to the sleeve 55. This will cause lever 54 to swing about its pivot and the pawl 53 to actuate the ratchet wheel 52, gear 50, gear 49, and head 40. Consequently another projection 44 will be moved to position in engagement with the lever 45 and just before this projection gets under the notch 47, the elevated portion 97 of bar 96 will pass from under finger 48' so that lever 45 will drop down and allow the projection 44 to enter the notch 47. Consequently further rotation of the head 40 will be prevented and a new record will be brought to active position. The pulley 43 of this new record will be raised up into engagement with the belt 112 so that as soon as said new record is brought to such elevated position, it will begin to rotate. As soon as the carriage reaches its initial position, the finger 65 will pass off of the end of rail 63, the carriage will swing down to its normal position with the screw 64 bearing on the rail 63, and the feed block 82 will move up against and engage the screw 77. If the arm 98 has been shifted so as not to engage the latch 33, the carriage will begin to travel along the rail as hereinbefore described, the foregoing operation being repeated. If, however, arm 98 is so positioned as to engage and actuate the latch 33 when the carriage is returned to its initial position, said latch 33 will be pressed back and lever 29 will become released from shoulder 35. Thus spring 32 will pull upwardly on the lever and cause the brake shoe 26 to engage the disk 22, thus bringing the motor to a stop. If, however, an electric motor is used, this operation of lever 29 will result in breaking the contact with the spring 38. This will stop the operation of the motor as before described. In order to insure the prompt engagement of a projection 44 by the lever 45, a spring 114 is arranged so as to force the lever downwardly as soon as its notch is brought above one of the projections 44.

By means of the apparatus herein described, it will be seen that reproductions can be made continuously from a series of records or, if desired, the mechanism can be brought to a stop after a reproduction has been made from one record. Various means can be employed for controlling the



operation of the mechanism by means of a check or coin. Where such a means is used, it is designed to have the arm 98 so located as to release the lever 29 each time the carriage is returned to its initial position so that only one record will be heard after a check or coin has been deposited. The check controlled means preferably includes a slide 115 mounted upon the housing 27 and within a hood 116, this slide having a finger piece 117 whereby it can be shifted readily so as to direct a check downwardly against the head 28. Inasmuch as this coin controlled mechanism constitutes no part of the present invention, it has not been illustrated or described in detail.

What is claimed is:—

1. The combination with a carriage mounted for backward and forward movement, of means for positively feeding the carriage in one direction, a continuously operating flexible element constituting returning means, means for automatically disengaging the carriage from its feeding means upon reaching one limit of its movement, and means upon the carriage for engaging the returning means upon release of the carriage from its feeding means.

2. The combination with a carriage and means for feeding the same positively in one direction, of a continuously moving flexible element constituting returning means, means for automatically rocking the carriage upon reaching one limit of its movement to disengage it from its feeding means, and a coupling element upon the carriage and movable into engagement with the returning means when the carriage is rocked.

3. The combination with a carriage and means for feeding the same positively in one direction, of a continuously moving flexible element constituting returning means, means for automatically rocking the carriage upon reaching one limit of its movement to disengage it from its feeding means, a coupling element upon the carriage and movable into engagement with the returning means when the carriage is rocked, and means coöperating with the carriage for maintaining said coupling means in engagement with the returning means until the carriage has returned to its initial position.

4. The combination with a guide rod, of a carriage mounted to slide and to rock thereon, means for positively feeding the carriage in one direction, a continuously moving flexible element constituting returning means, a continuously oscillating lifting element, means upon the carriage and movable into engagement with the lifting element when the carriage reaches one limit of its movement, and means upon the carriage and shifted thereby when the carriage is lifted, into engagement with the returning means.

5. The combination with a guide rod, of a carriage mounted to slide and to rock thereon, means for positively feeding the carriage in one direction, a continuously moving flexible element constituting returning means, a continuously oscillating lifting element, means upon the carriage and movable into engagement with the lifting element when the carriage reaches one limit of its movement, means upon the carriage and shifted thereby when the carriage is lifted, into engagement with the returning means, and means for holding said carriage in lifted position until returned to its initial point.

6. The combination with a guide rod, of a carriage mounted to slide and to rock thereon, means for positively feeding the carriage in one direction, a continuously moving flexible element constituting returning means, a continuously oscillating lifting element, means upon the carriage and movable into engagement with the lifting element when the carriage reaches one limit of its movement, means upon the carriage and shifted thereby when the carriage is lifted, into engagement with the returning means, and means for holding said carriage in lifted position until returned to its initial point, said means including a rail and means on the carriage and movable over the rail, said means being movable under the rail during the positive feeding of the carriage to hold the carriage against upward movement until engaged by the lifting means.

7. The combination with a guide rod and flexible returning means parallel therewith, and means for continuously actuating the returning means, of a carriage mounted to slide and rock upon the rod, means for positively feeding the carriage in one direction, a continuously oscillating lifting element, means on the carriage and movable into the path of the lifting element when the carriage reaches one limit of its movement and coöperating with said lifting element to rock the carriage upwardly, and coupling means upon the carriage and movable into engagement with the returning means during the upward rocking of the carriage.

8. The combination with a guide rod, a rail, and a flexible returning means parallel with the rod, of a carriage mounted to slide and rock upon the rod, means for positively feeding the carriage in one direction, a continuously oscillating lifting element, a finger extending from the carriage and movable under the rail to hold the carriage against upward movement, means upon the carriage and movable into the path of the lifting element when said finger passes from under the rail, said means and lifting element coöperating to rock the carriage upwardly, means coöperating with the carriage for momentarily sustaining the carriage in elevated position during the initial portion of its re-



turn movement, said finger being adapted to move onto the rail during the remaining portion of the return movement, and coupling means upon the carriage and shiftable into engagement with the returning means during the upward movement of the carriage, said returning means and coupling means coöperating to return the carriage to its initial position.

9. The combination with a guide rod, and a continuously moving flexible returning means, of a carriage mounted to slide and rock upon the rod, a hanger depending from the carriage, a continuously oscillating lifting finger, means for successively deflecting the hanger laterally and releasing it to engage the lifting finger when the carriage reaches one limit of its movement, means for positively feeding the carriage to said limit of its movement, and means upon the carriage and shiftable thereby when lifted, to couple the carriage to the returning means.

10. The combination with a guide rod, and a continuously moving flexible returning means, of a carriage mounted to slide and rock upon the rod, a hanger depending from the carriage, a continuously oscillating lifting finger, means for successively deflecting the hanger laterally and releasing it to engage the lifting finger when the carriage reaches one limit of its movement, means for positively feeding the carriage to said limit of its movement, means upon the carriage and shiftable thereby when lifted, to couple the carriage to the returning means, and means for holding the carriage in rocked position until returned to its initial point.

11. The combination with a guide rod, of a carriage mounted to slide and rock thereon, separate means for moving the carriage backward and forward along the rod, means for swinging the carriage upwardly upon the rod upon reaching one limit of its movement, a reproducer movable with the carriage, and a stationary brush, the needle of the reproducer being movable under the

brush during the movement of the carriage in one direction and being movable over the brush during the movement of the carriage in the opposite direction.

12. The combination with a stationary brush, of a carriage, a reproducer movable with the carriage, means for actuating the carriage in one direction to move the needle of the reproducer under the brush, means for automatically lifting the carriage and reproducer upon reaching one limit of movement of the carriage, and means for moving the carriage and reproducer back to their point of starting, said brush being adapted for engagement by the needle of the reproducer during such return movement.

13. The combination with a stationary brush, and a reproducer, of a carriage therefor mounted for backward and forward movement, means for holding the needle of the reproducer under the brush during the movement of the carriage in one direction, and for supporting the needle of the reproducer above and in contact with the brush during the movement of the reproducer and carriage in the opposite direction.

14. The combination with a stationary brush, of a reproducer mounted for movement relatively thereto and including a diaphragm, a lever, a pin mounted for rotation therein, yielding means for holding the pin normally in a predetermined relation with the lever, a secondary lever fulcrumed upon the pin, a connection between the secondary lever and the diaphragm, and a needle carried by the secondary lever, said pin being revoluble relatively to the first named lever during the movement of the needle over the brush.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WALTER EDGAR CHILDERS.

Witnesses:

HERBERT D. LAWSON,  
M. E. MCCARTHY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC STOPPING DEVICE FOR  
PHONOGRAPHS,

# 1,141,507-----E. C. Walter,  
Patented-June 1st, 1915.  
Filed-November 4th, 1913.

E. C. WALTER.  
 AUTOMATIC STOPPING DEVICE FOR PHONOGRAPHS.  
 APPLICATION FILED NOV. 4, 1913.

1,141,507.

Patented June 1, 1915.  
 2 SHEETS—SHEET 1.

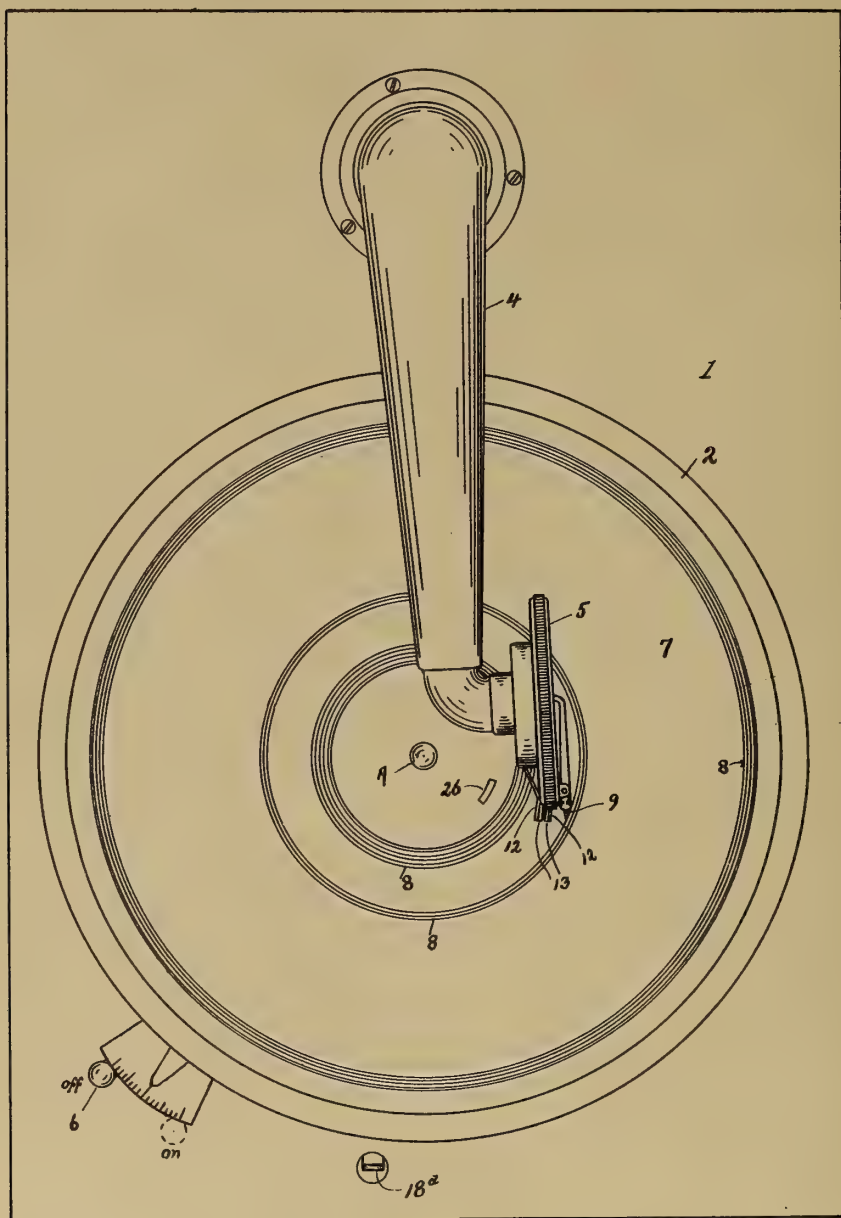


Fig. 1.

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 BY  
*Edmund H. Larry*  
 ATTORNEY



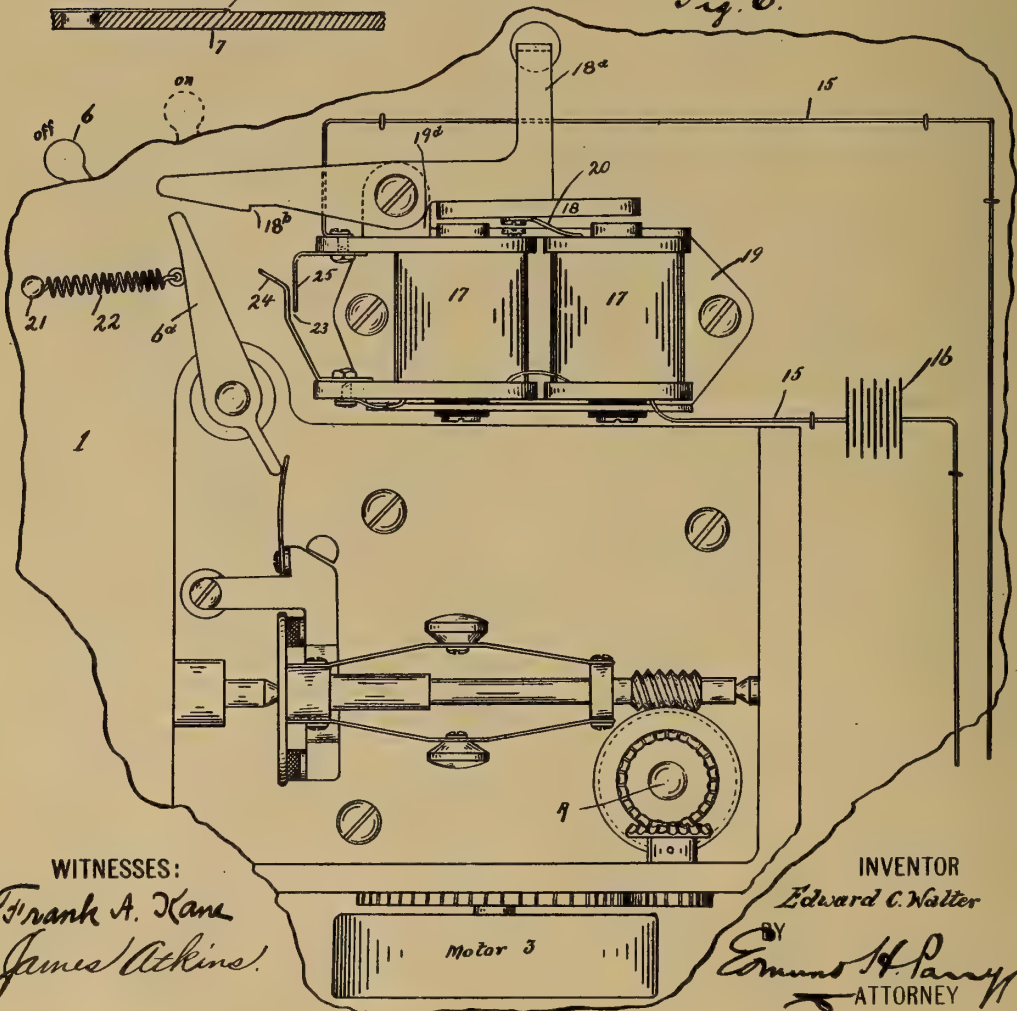
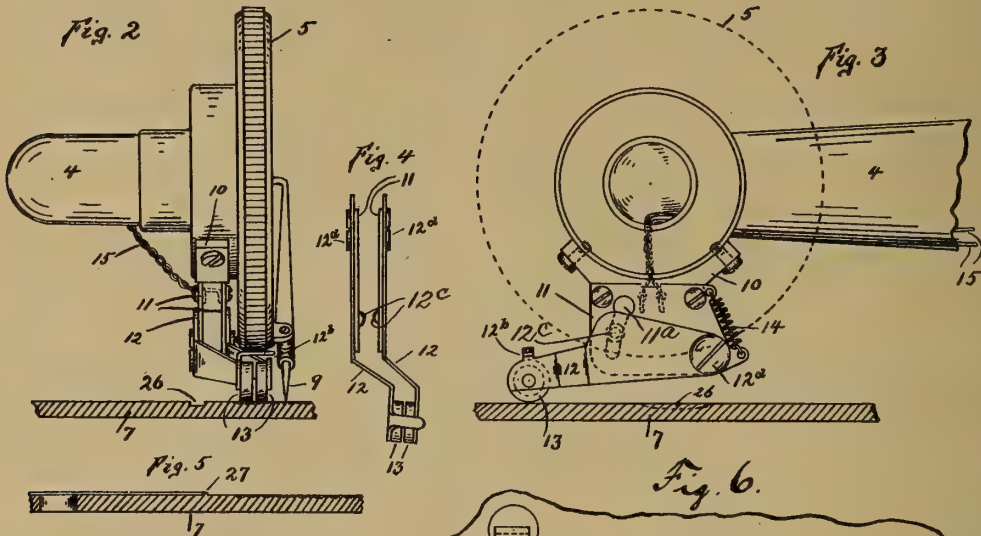


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 AUTOMATIC STOPPING DEVICE FOR PHONOGRAPHS.  
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1,141,507.

Patented June 1, 1915.

2 SHEETS—SHEET 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

EDWARD C. WALTER, OF NEW YORK, N. Y.

## AUTOMATIC STOPPING DEVICE FOR PHONOGRAPHS.

1,141,507.

Specification of Letters Patent. Patented June 1, 1915.

Application filed November 4, 1913. Serial No 799,220.

*To all whom it may concern:*

Be it known that I, EDWARD C. WALTER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Automatic Stopping Devices for Phonographs, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to attachments for phonographs.

The object of the invention is to provide means for automatically stopping a phonograph or a machine of like character, which means is entirely automatic in its action.

Another object is to eliminate all mechanism which requires setting by an operator.

Another object is to provide a structure which will not interfere in any way with the operation of the machine, which will be of neat appearance, and which can be manufactured at low cost.

Another object is so to construct the device that it will be self-adjusting for different lengths of needles and for different thicknesses of records.

Another object is to provide manually-operated means, in addition to the automatic means, for causing arresting operation of the machine.

The invention resides broadly in the features of construction, combinations of elements, and aggroupments of parts, and in various aggroupments thereof, all as will be exemplified in the construction hereinafter set forth, and the scope of application of which will be indicated in the claims hereto appended.

While I have illustrated my invention in the accompanying drawings, by way of example, as attached to a well-known make of phonograph, it is to be understood that it may readily be adapted to other makes of machines without departing from the spirit of the invention.

In the accompanying drawings: Figure 1 is a view in plan of a phonograph showing a tone-arm, a reproducer mounted thereon, a revolving disk and record, and starting and stopping devices; Fig. 2 is a fragmentary view, in front elevation and partly in section, of the tone-arm and reproducer with the automatic device attached; Fig. 3 is a fragmentary view, in side elevation, and partly in section, of the parts shown in Fig.

2; Fig. 4 is a detail view in plan of the plates and the arms carried thereby, and showing the overlapping portion and the cushions; Fig. 5 is a fragmentary view in section of a record, showing a mechanism-controlling ridge; and Fig. 6 is a fragmentary view in plan of the under side of the top of the cabinet, showing the lower end of the starting and stopping lever, the magnet and its connections, and the motor.

The machine, preferably and as shown, is partly mounted above a baseboard or top 1 of a cabinet and the rest of the mechanism is preferably disposed beneath the base 1 and inside the cabinet. A disk 2 is arranged above the base and is given a rotary movement by a motor 3 disposed beneath the base 1, and a tone-arm 4 which carries a reproducer 5 is also thus disposed. Projecting above the base 1 is a lever 6 for starting and stopping operation of the motor.

The operation of the machine is as follows: A record-disk 7 provided with a spiral tone-groove 8 is placed on the disk 2, a needle 9 or projection is fastened in the reproducer 5, whereupon the starting and stopping-lever 6 is moved to cause the motor to revolve the record. The reproducer 5 and tone-arm 4 are moved by hand over the record 7 until the needle 9 is positioned in the outermost portion of the tone-groove 8. The revolving record, as the needle traversing the spiral tone-groove, will cause the tone-arm and reproducer to move toward the axis of the record. When the needle arrives at the end of the spiral groove, the operator stops the machine by moving the starting lever 6 in a direction opposite to that which started the motor.

Means are provided to cause the starting-lever 6 to stop the machine automatically, when the needle 9 arrives at or near the end of the spiral groove 8, and such means will now be explained:

Attached to the tone-arm 4 and at the side of the reproducer 5 (but not in the way to prevent the reproducer from being revolved or tilted) is a lug or pendant support 10, preferably of suitable insulating material. Mounted on each side of this support are plates 11 provided with elongated holes or incuts 11<sup>a</sup>. Each plate 11 carries or has fulcrumed to it an arm 12, offset at its forward portion so as to occupy a position close to the needle 9 carried by the reproducer 5. Attached to the forward ends of the arms 12



are cushions 13 of leather or other soft material and headed studs or stops 12<sup>c</sup> adapted to enter the elongated holes or incuts 11<sup>a</sup> to hold the arms 12 close to the plates 11 and to limit the up and down movement of the said arms. Attached to the rear ends of the arms 12 are springs 14, which are also attached to the plates 11. These springs 14 will cause the arms 12 to be held in their lowermost position when the cushions 13 are not resting on the record 7. When the arms 12 are in their lowermost position, the stops 12<sup>c</sup> will abut against the lower ends of the elongated holes or incuts 11<sup>a</sup> and the arms will be held in a non-contacting position, and the cushions 13 will be below the plane of the point of the longest needle 9 that might be used.

While the needle is being placed in the tone-groove 8, the cushions 13 abut against the record 7 first, and then the weight of the tone-arm 4 and the reproducer 5 will extend the springs 14 until the needle 9 rests in the tone-groove 8. The cushions 13 are held stationary by resting on the record 7 while the rear ends of the arms 12 are turning on their fulcrum 12<sup>a</sup> and are being lowered to allow the needle to rest in the tone-groove. This action allows for the use of needles of different lengths or different thicknesses of records or both, and causes the stops 12<sup>c</sup> to be moved away from the ends of the incuts 11<sup>a</sup>.

The cushions, by resting in the tone-groove or on top of the record, will have a tendency to steady and feed the tone-arm and reproducer across the record. This will permit the stylus to lie more evenly in the tone-groove and also relieve the outer side of the tone-groove to some extent of the strain incident to feeding the tone-arm and reproducer across the record. The stylus being relieved of this strain is free to receive the full effect of the vibrations from the tone-groove, resulting in the production of clear and natural tones.

One of the arms 12—preferably the one farthest from the needle—overlies the other arm 12 and is separated therefrom (when the arms are in their lowermost position and when the stops 12<sup>c</sup> are abutting against the lower ends of the elongated holes or incuts 11<sup>a</sup> by a small space 12<sup>b</sup>.) By this arrangement, the left arm 12—that farthest from the needle 9—will contact with the other arm 12 whenever the left arm drops below the plane of the right arm, or whenever the right arm is raised above the plane of the left arm.

Electrical connection is made to the plates 11 by wires 15 which are carried through the tone-arm 4 and down into the lower portion of the cabinet to an electric battery 16 and a magnet 17. The magnet 17 upon being energized by the battery 16 (when con-

tact is made between the arms 12) moves an armature-arm 18 which is fulcrumed on a projection 19<sup>a</sup> of the magnet-support 19. The other end of the arm 18 is notched at 18<sup>b</sup> to form a latch in which the lower end 6<sup>a</sup> of the starting-lever 6 is held when the lever is moved by the operator to the starting or running position. A light spring 20 is adapted to cause the arm 18 to latch by the lower end 6<sup>a</sup> of the lever when being brought to the starting position.

Attached to the lower end 6<sup>a</sup> of the starting lever and also to a pin 21 on the underside of the base 1 is a spring 22 of sufficient strength to move the starting lever to the off-position when the lever is released from the notch 18<sup>b</sup> in the armature arm 18 either by the action of the magnet 17 on the armature arm 18 when said magnet is energized, or by means now to be described:

A portion 18<sup>a</sup> of the armature arm 18 projects up through the top of the cabinet and forms a means whereby the operator may, by pressing thereon, move said arm (in lieu of the magnet) to release the starting lever 6 from the notch 18<sup>b</sup> therein.

To conserve the life of the battery 16, a break 23 in the wiring is maintained when the starting-lever 6 is at the off-position. When the lever is moved to the on-position, this break 23 in the circuit is closed by the lower end 6<sup>a</sup> of the lever 6 abutting against and moving a flat spring 24 into contact with another flat spring 25. One of the wires 15 is cut and an end fastened to each of the springs 24 and 25.

When the operator moves the lever 6 to the on-position, the spring 22 is tensioned sufficiently automatically to return the same to the off-position when released, thus breaking the circuit at 23 and causing the machine to come to a stop.

The tone-record is provided with a depression 26, positioned at a predetermined distance from the inner end of the tone-groove 8. In lieu of this, the record may be provided with a slight ridge 27 positioned at a predetermined distance from the inner end of the tone-groove 8. The depression 26, or the ridge 27 (Figs. 2 and 5) of the record will permit the left arm 12 to drop when the needle arrives at the end of the groove, thereby forming a contact at 12<sup>b</sup> between the two arms 12; or will cause the right arm 12 to rise to contact with the left arm 12, thereby completing an electrical circuit between the battery 16 and the magnet 17 when the starting-lever 6 is at the on-position, which position is necessary to close the break 23 in the wiring at that point. It will, therefore, be clear that by using a record provided either with the ridge 27, or with the depression 26, properly placed with relation to the end of the tone-groove 8, in connection with a machine equipped



with my device, all that is necessary for the operator to do is, first, to place the record 7 on the disk, then, to start the machine by moving the starting-lever 6 to the on-position, and, finally, to place the needle 9 in the outer end of the tone-groove 8. When the record 7 has been played, the machine will, by means of my improvement, automatically stop running.

From the foregoing, it will be perceived that I have devised a structure which achieves the several objects hereinabove set forth, as well as other objects, and that it is adapted to perform its functions with certainty of operation and without in any way disturbing the operation or function of the phonograph itself.

While I have hereinabove described my invention in detail and illustrated a particular form of structure, nevertheless, it is to be understood that the disclosure is merely an exemplification of one of many possible embodiments; and, also, that the following claims are directed to the structure generically and are to be interpreted broadly, except where the details are specified therein.

What I claim is:

1. In a phonograph, a rotating member, a swinging member engaging said rotating member, and a plurality of arms and normally separated overlapping contact-points mounted on and insulated from the swinging member and movable under the influence of the rotating member to eliminate the separation between the contact-points and permit them to contact one with the other.

2. In combination, a swinging member, arms mounted thereon and insulated therefrom, and overlapping contact-points and disk-engaging cushion-elements carried by the forward ends of the arms.

3. In combination, a swinging member, a pair of overlapping arms carried thereby, cushions carried by the forward ends of the arms, and springs engaging the rear ends of the arms.

4. In combination, a swinging member, a support carried thereby, a plate at each side of the support, an arm fulcrumed to each plate, cushions carried by the forward ends of the arms, overlapping contact-points also carried by said arms, and springs connecting with the arms and the plates.

5. In combination a swinging-member, a support fastened to the member, two plates fastened to the support and insulated from one another and from the member, and arms fastened to the plates and overlapping one another and movable to abut against each other.

6. In combination, a rotating member, a swinging member, a support on the swinging member, a plate disposed at each side of the support and insulated from each other and from the swinging member, an arm carried

by each plate and one overlapping the other and normally separated from that other, cushions carried by the forward ends of the arms, and springs fastened to the arms and to the plates and operating to cause the arms to be lowered whenever free to do so.

7. The combination in a phonograph, of a support, a rotating member supported thereby and provided with a depression, a swinging member normally overlying the rotating member, and arms carried by and insulated from the swinging member and overlapping one another and normally disconnected and relatively movable to abut against one another when one of said arms drops into the depression of said rotating member.

8. The combination in a phonograph, of a support, a rotating member supported thereby and provided with a depression, a swinging member normally overlying the rotating member, a supporting-element carried by the swinging member, and arms carried by the supporting element and insulated from one another and overlapping one another and normally disconnected from each other and relatively movable when actuated by said depression to abut against each other.

9. The combination in a phonograph, of a support, a rotating member supported thereby and having a depression, a swinging member, overlapping contact points carried by the swinging member, and cushions carried by the contact points and arranged to rest on the rotating member to maintain a space between the contact points until one of the cushions drop into the depression in said rotating member thereby causing the contact points to have relative movement and to abut against one another.

10. The combination of a disk, a swinging arm, normally non-contacting contact points attached to said arm, and cushions carried by said contact points and adapted to traverse said disk and thereby hold the contact points apart, and a depression for receiving one of the cushions and thereby lowering one of said arms until the contact point carried thereby contacts with the contact point carried by the other arm.

11. The combination in a phonograph, of a disk provided with a depression, a battery, a magnet connected thereto, a swinging arm, and overlapping arms carried by said arm and connected to said battery, said arms forming a contact to complete the circuit between said battery and magnet when one of said arms drops into the depression in said disk.

12. The combination in a phonograph, of a swinging arm, self-adjusting and overlapping arms carried by the arm, cushions attached to said arms, and a rotating member upon which the swinging arm and cushions



rest, the arms being self-adjusting to allow the swinging arm to be sustained by the rotating member in various positions of elevation.

5 13. The combination in a phonograph, of a swinging arm, self-adjusting and overlapping arms carried by the arm, and cushions carried by said arms, the latter being adjustable to permit relative movement of  
10 said swinging arm and said arms carried thereby.

14. The combination in a phonograph, of a disk, a swinging member provided with a removable projection arranged to rest on  
15 said disk, overlapping and normally disconnected arms carried by said swinging member, and cushions on the ends of the arms, the lower edges of the cushions normally occupying a position below the removable pro-  
20 jection but positionable in line with the extremity of the same when it and the cushions rest upon the disk and thereby holding the overlapping arms in a non-contacting position.

25 15. The combination in a sound-producing machine, a swinging arm, overlapping electrical contact-points mounted on the swinging arm and insulated therefrom and normally out of contact with one another, a  
30 support, a rotating member carried by the support and provided with a groove, and means carried by the rotating member for permitting the contact points to contact with one another.

35 16. The combination in a phonograph, of a rotatable support, a member mounted thereon and rotating therewith and provided with a depression and a groove, a motor for revolving the support and member, a  
40 starting lever for the motor, an armature-arm provided with a catch for holding the starting lever in an on-position, a spring for moving the starting lever to an off-position when released from the catch, a magnet  
45 adapted when energized to move said armature-arm to release the starting lever from the catch, a battery for energizing the magnet, a swinging arm, a holder carried by the  
50 swinging arm, a needle in the holder and arranged to travel in the groove in said member, a pair of arms, overlapping and normally disconnected electrical contact-points and cushions thereon, said arms being  
55 electrically connected to said battery and magnet, said cushions being arranged to rest upon the rotatable member to maintain disconnection of said contact points and be moved across the rotatable member by the  
60 needle traveling in the groove therein until one of the cushions drops into the depression in said member thereby causing one of the arms and one of the contact points to be lowered until it abuts against the other contact  
65 point and completes an electrical cir-

cuit, this causing actuation of the armature-arm and release of the starting lever from the catch therein.

17. The combination in a phonograph, of a swinging member, adjustable overlapping  
70 arms attached thereto, cushions attached to said arms, and a rotating member upon which the swinging member and cushions rest, the arms being adjustable to permit the swinging member to be held in various  
75 elevated positions.

18. The combination in a phonograph, of a rotating member, a swinging member supported at one end thereby, and adjustable  
80 overlapping arms attached to said swinging member and adapted to rest on said rotating member, said arms being adjustable to permit relative movement of the swinging member and the arms carried thereby.

19. The combination in a phonograph, of  
85 a rotating member, and a swinging member supported at one of its ends thereby and provided with vertically movable overlapping contact points adapted to rest on said  
90 rotating member, said overlapping contact points being vertically movable to permit relative movement of said swinging member and contact points and to thus assure their contact with said rotating member.

20. The combination in a phonograph, of  
95 a rotating member, a swinging member supported at one end thereby and movable in relation thereto, and vertically movable arms attached to the swinging member and provided with overlapping contact points  
100 and cushion elements adapted to rest on said rotating member while said swinging member occupies any of a plurality of positions relatively to the rotating member.

21. The combination in a phonograph, of  
105 a swinging member, a pair of overlapping and normally non-contacting arms fulcrumed thereon, stops for holding the arms in a non-contacting position, and springs for holding said arms in said position and  
110 against said stops.

22. The combination in a phonograph, of a swinging member, a support carried thereby, a plate provided with an incut at each  
115 side of the support, an arm fulcrumed on each plate, each of said arms being provided with a projection to enter one of said incuts, and springs attached to said arms and plates to hold said arms in a lowered position whereby said projections will be held  
120 against the lower ends of the incuts.

23. The combination in a phonograph, of a swinging member, a support carried thereby, a plate provided with an incut fastened  
125 one on each side of the support, and an arm provided with a projection fulcrumed on each plate, the projection entering said incut to limit movement of the arm.

24. In a phonograph, the combination of a swinging member, a support carried there-  
130



by, a plate provided with an incut and attached one on each side of said support, a pair of overlapping and normally non-contacting arms each fulcrumed on a plate, a  
5 projection on each arm adapted to enter an incut, and springs attached to said arms and plates and adapted to hold said projections against one end of said incuts and thereby hold said arms in a non-contacting  
10 position.

25. In a phonograph, the combination of a swinging member, a support carried thereby, a plate fastened one on each side of the support, said plates each being provided  
15 with an elongated hole, an arm fulcrumed on each plate and provided with a projection adapted to enter the hole of the plate to which the arm is fulcrumed, springs attached to said arms and said plates and  
20 adapted to hold said projections against the

ends of said holes, and a rotating member upon which said arms rest to move said projections away from the ends of the holes.

26. The combination in a phonograph, of a revolving disk, a swinging member, a  
25 pair of arms provided with overlapping and normally non-contacting contact points and cushion elements attached to said swinging member, said cushions being adapted to rest upon said disk, and said disk  
30 having means for causing one of the said arms to move relatively to and contact with the other arm.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD C. WALTER.

Witnesses:

THOMAS C. ADAMSON,  
DAVID J. OLIVER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

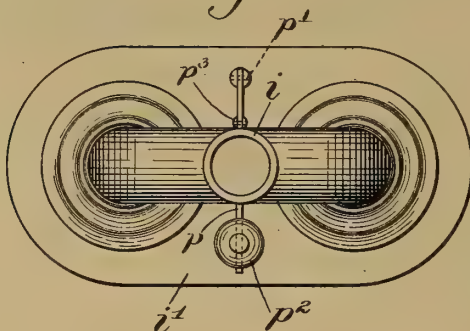


SOUND REPRODUCING OR RECORDING MACHINE,  
# 1,141,672-----P---G.H.Underhill,  
Patented-June 1st, 1915.  
Filed-May 27th, 1905.

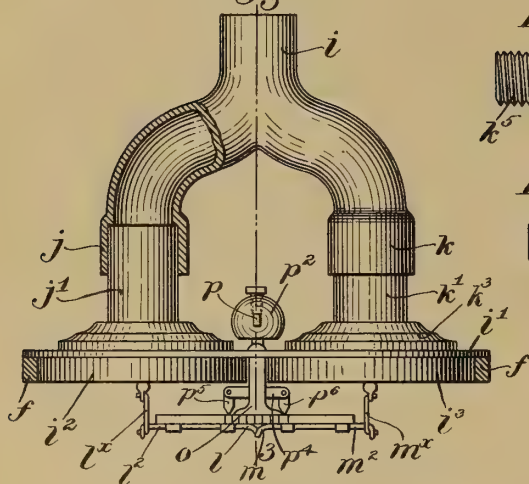


1,141,672.

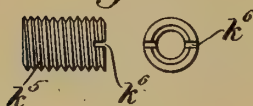
*Fig. 1.*



*Fig. 2.*



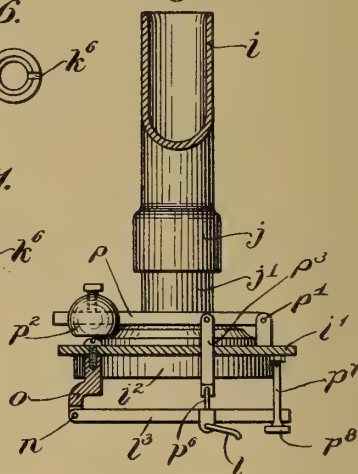
*Fig. 6.*



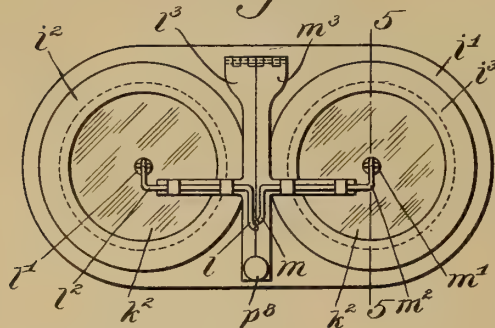
*Fig. 7.*



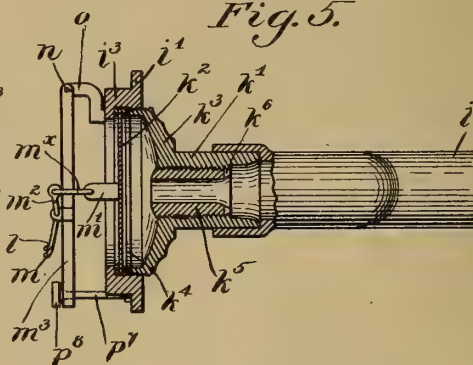
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



Franklin E. Low.  
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by Emory Booth Powell

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

GEORGE H. UNDERHILL, OF BOSTON, MASSACHUSETTS,

SOUND REPRODUCING OR RECORDING MACHINE.

1,141,672.

Specification of Letters Patent.

Patented June 1, 1915.

Original application filed June 11, 1904, Serial No. 212,079. Divided and this application filed May 27, 1905. Serial No. 262,579.

*To all whom it may concern:*

Be it known that I, GEORGE H. UNDERHILL, a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Sound Reproducing or Recording Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to phonographic apparatus, being more particularly concerned with improvements in the sound reproducing and sound recording mechanism thereof.

The present application is a divisional of my prior copending application, Serial Number 212,079, filed June 11, 1904.

My invention will be best understood by reference to the following description, when taken in connection with the accompanying illustration of one specific embodiment thereof selected for illustrative purposes only; while its scope will be more particularly pointed out in the appended claims.

In the drawings,—Figure 1 is a plan showing one form of sound box constructed according to my invention; Fig. 2 is a front elevation thereof, partially broken away; Fig. 3 is a section on the line 3—3, Fig. 2; Fig. 4 is a view looking from beneath the sound box as seen in Fig. 2; Fig. 5 is a section on the line 5—5, in Fig. 4; Fig. 6 shows one form of the removable throat; and, Fig. 7 is a different form thereof.

Referring to the drawings I have there shown one form of my improved sound box, the same together with its associated parts being shown without reference to any particular phonographic machine. The sound box there shown is applicable to various types of commercial machines, and its adaptation and application thereto, so far as it is not referred to in the following description, will be obvious to those skilled in the art.

The sound tube, *i*, is preferably bifurcated, to provide the branches, *j*, and, *k*, into which may be slid and frictionally held the tubular portions, *j'*, and, *k'*, of the sound box. The latter is provided with a double set of recording and reproducing devices, and I have herein shown those of one set

as substantially duplicated by those of the other set. This, it is to be understood however, is not essential to my invention as the diaphragm and other elements of the mechanism may for certain purposes be widely different. The sound box consists generally of a double head or casing, *i'*, and when in use is adapted to be frictionally held within a suitably shaped double yoke, secured to a movable arm, by which the sound box will be caused to traverse the record.

The casing, *i'*, is provided with two cylindrical portions, *i<sup>2</sup>*, and *i<sup>3</sup>*, that shown in *i<sup>3</sup>*, for example (see Fig. 5), being provided with a diaphragm, *k<sup>2</sup>*, placed between two annular rings of yieldable packing material, such as rubber, and held against a shoulder in the casing by means of the back-piece, *k<sup>3</sup>*, screwed into the back of the casing *i'* against the preferably metallic washer, *k<sup>4</sup>*. Within the tubular portion, *k'*, of the back-piece, *k<sup>3</sup>*, and preferably axially alined therewith and with the diaphragm, *k<sup>2</sup>*, I have provided the throat, *k<sup>5</sup>*, preferably threaded or otherwise constructed to provide adjustment thereof relatively to the face of the diaphragm, the end of the throat adjacent the diaphragm being suitably shaped for the most efficient effect, as by beveling the same, in the manner shown.

I have found that it is not only desirable to have the sound orifice of each throat adjustable relatively to the diaphragm, but that each particular class of sound requires a special sound orifice for its most effective reproduction. For example I have found that the full harmony of a brass band will usually be best developed through the employment of a throat having the general form of that shown in Figs. 5 and 6, while the note of a violin is more faithfully reproduced by a differently shaped throat, as, for example, that shown in section in Fig. 7. This I believe to be due to a capacity of the throat shown in Fig. 7, where its formation is relatively sharp, for selecting to a greater extent those waves emanating from the center of the diaphragm, and the capacity of the throat shown in Fig. 5, which is comparatively blunt for receiving and transmitting to a greater extent sound vibrations acting not only from the center but from the extremities of the diaphragm as well. The provision of means for altering the character of the passage for sound waves



to or from the diaphragm, such, for example, as by providing a plurality of such throats, each proportioned or formed with respect to a particular quality of sound, in the reproduction of which it is intended to be used, and replaceable one by another, forms an important feature of my invention. Referring to Figs. 5 and 6, I have provided the slot,  $k^6$ , in the outer end of the throat member, which, when the box is removed from the sound tube, may be conveniently engaged by a screw driver or other implement to adjust the mouth of the throat in any desired relative position to the diaphragm, or to remove the same entirely and replace it by another of different shape, size or proportion.

The two styli are here employed in order to provide a multiple effect, the production of which, however, is obviously not limited to the use merely of two. Each of two styli,  $l$ , and,  $m$ , is connected to its respective diaphragm through the connecting body,  $l'$ ,  $m'$ , the links  $l''$ , and,  $m''$ , and the rockshafts,  $l^2$ ,  $m^2$ , so that, when in the operative position shown in Fig. 2 (see also Fig. 4), the point of the second stylus is caused to trail in the same record groove as the first stylus, but directly and immediately behind the latter, and also arranged so that the vibrations communicated to each stylus point are transmitted directly and efficiently to the corresponding diaphragm. The stylus points with their rockshafts are respectively supported and movable with the vibratable levers,  $l^3$ , and  $m^3$ , arranged side by side and hinged at,  $n$  (Figs. 3 and 5) to permit the individual and relative movement of the said levers to and from the surface of the record. Additionally the stud  $o$  carrying the support  $n$  is mounted to turn in its seat so as to permit a slight lateral movement common to each stylus movement when such movement is requisite. Thus, although free vibration is permitted the stylus points in the reproduction of the intended sound, they are compelled always to track one after the other, and the lateral movement of one no matter from what cause, must be followed by a like movement of the other.

An equalized tension, tending normally to press the stylus points toward the face of the record, is maintained upon the two stylus points by means of the lever,  $p$ , fulcrumed at,  $p'$ , carrying the adjustable weight,  $p^2$ , the latter acting through the bar  $p^3$ , equalizing rod,  $p^4$ , and pressure points,  $p^5$ ,  $p^6$ , engaging respectively or connected with the backs of the levers,  $l^3$ , and,  $m^3$ . Thus, when the sound box is adjusted relatively to the record, and the stylus point or points have found and entered the groove therein, the force pressing the same into the groove may be varied by adjustment of the weight,  $p^2$ ,

along the lever  $p$ ; this force, however, being distributed upon the two points by means of the equalizing bar,  $p^4$ , thereby to maintain an individual tension upon each of the co-operating stylus points, such tension being proportioned to their individual requirements and the movement of one stylus point with its supporting lever in no way conflicting with simultaneous movement of the other point and its lever, whether such movements are similar or dissimilar. In order to relieve the diaphragm and its connections from the weight of the stylus parts, including the weight,  $p^2$ , when the sound box has been lifted or withdrawn from the face of the record, I have provided the supporting pin with a cone-shaped enlarged head,  $p^8$ , against which the suitably formed ends of the levers,  $m^3$ , and,  $n^3$ , rest when the stylus points are withdrawn from the record, but so located as to permit free vibration of the said levers, under the influence of the record, when the points are in contact therewith and moved under the influence of the record groove therein. The peculiar cone shaped head of the face  $p^8$ , and the correspondingly formed walls upon the two levers, permit repeated withdrawals of the points from the record groove with positive assurance, however, that the points will meet the record at exactly the same spot from which they were withdrawn, the record and the sound box, meanwhile, having undergone no relative movement.

I have found that the arrangement shown of multiple diaphragms, where they are grouped or clustered about a common position toward which their vibration mechanism is directed, provides a highly efficient, and in fact so far as I am aware the only practical, construction for obtaining a multiple effect. I have also found that the effectiveness of the machine is greatly increased by the inter-connection which exists between the vibration parts of each system through which there is maintained a constant tendency for the stylus points and diaphragms to move in conjunction and co-operation, each one with the other or others.

It will be understood that my invention is susceptible of embodiment in a great variety of forms and may be combined in various ways which I have not here attempted to illustrate, since the same are included within the scope of my invention as set forth.

I claim—

1. In an apparatus of the class described, a plurality of coöperating stylus points, tension means for said points and means for equalizing the tension.

2. In an apparatus of the class described the combination with a plurality of stylus points arranged to coöperate one with the other in substantially the same portion of the same record groove, connecting means



between the same and movable therewith, of a plurality of diaphragms connected respectively with said points, each of said diaphragms having a separate chamber.

5 3. In an apparatus of the class described the combination with a plurality of stylus points arranged to cooperate one with the other in substantially the same portion of the same record groove, of a plurality of  
10 diaphragms laterally disposed with respect to the record groove and connected with said points.

4. In an apparatus of the class described, the combination with a plurality of dia-  
15 phragms having their respective sound boxes grouped with reference to substantially the same point of stylus action, of vibratory mechanism for each of said diaphragms including independent stylus points and stylus  
20 connections diverging generally from such point of stylus action.

5. In a sound-reproducing or sound-re-  
cording machine the combination with a  
25 plurality of cooperating diaphragms, of co-operating and inter-connected stylus points for said diaphragms.

6. In a sound-reproducing or sound-re-  
cording machine the combination with a  
30 plurality of sound boxes, provided each with its diaphragm, of a plurality of cooperating and inter-connected stylus points for said diaphragms.

7. In an apparatus of the class described the combination with a plurality of coop-  
35 eratively arranged stylus points, of means for permitting independent reproducing vibratory movement of said points, and means for providing individual tension therefor including connecting means between said  
40 points and movable therewith.

8. In an apparatus of the class described a plurality of cooperating but independ-  
ently vibratory stylus points and common  
45 tensioning means for said points.

9. In an apparatus of the class described, a plurality of cooperating stylus points and  
common equalizing tension means for said  
50 points.

10. In an apparatus of the class described  
50 a plurality of cooperating but independ-  
ently vibratory stylus points, of tension

means for said points having a common ad-  
justment.

11. In an apparatus of the class described a plurality of cooperating stylus points, of  
55 equalizing tension means for said points having a common adjustment.

12. In an apparatus of the class described the combination with a plurality of coop-  
erating diaphragms of cooperating stylus  
60 points connected respectively to said dia-  
phragms, said stylus points being carried  
by pivoted members having a common axis.

13. In an apparatus of the class described a plurality of stylus points carried respec-  
65 tively by members having independent vi-  
bratory movement, said members being ar-  
ranged side by side to prevent lateral rela-  
tive movement.

14. In an apparatus of the class described  
70 a plurality of stylus points pivoted for in-  
dependent movement in one plane but hav-  
ing a common pivotal axis for like move-  
ment in another plane.

15. In an apparatus of the class described  
75 a plurality of stylus supporting levers piv-  
oted for independent movement and a com-  
mon carrying member to which said levers  
are attached, said carrying member being  
also pivotally mounted to permit like move-  
80 ment of said stylus levers in one direction.

16. In an apparatus of the class described, the combination with vibratively separate  
stylus levers adapted to respond in unison  
to substantially the same portion of the  
85 sound groove, common tensioning means for  
said stylus levers, means whereby the com-  
mon but separated lever vibrations are con-  
verted into air vibrations and again united,  
said means including a plurality of dia-  
90 phragms phonetically associated having  
their respective sound boxes grouped with  
reference to substantially the same point  
of stylus action.

In testimony whereof, I have signed my  
95 name to this specification, in the presence  
of two subscribing witnesses.

GEORGE H. UNDERHILL.

Witnesses:

THOMAS B. BOOTH,  
EVERETT S. EMERY.



SOUND RECORDING APPARATUS,  
# 1,142,507-----T. A. Edison,  
Patented-June 8, 1915.  
Filed-October 20, 1910.

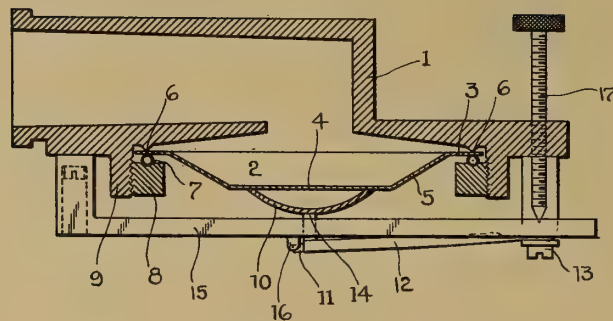


T. A. EDISON.  
SOUND RECORDING APPARATUS.  
APPLICATION FILED OCT. 20, 1910.

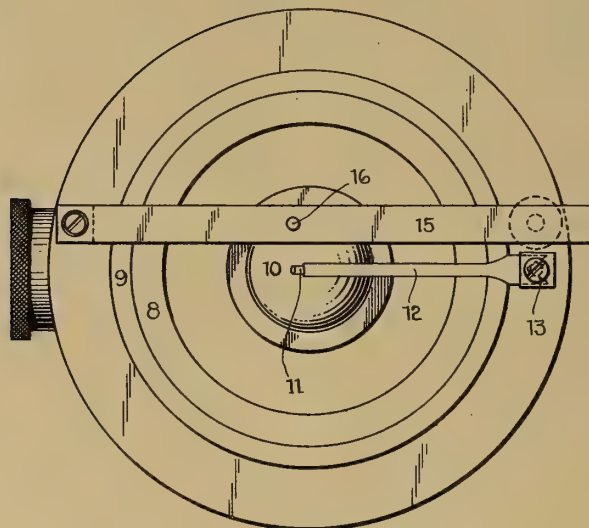
1,142,507.

Patented June 8, 1915.

*Fig 1*



*Fig 2*



*Witnesses:*  
Frank D. Lewis  
Dyer Smith

*Inventor:*  
Thomas A. Edison  
By Frank L. Brown  
His Atty.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SOUND-RECORDING APPARATUS.

1,142,507.

Specification of Letters Patent.

Patented June 8, 1915.

Application filed October 20, 1910. Serial No. 588,138.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Sound-Recording Apparatus, of which the following is a description.

My invention relates to devices for recording sound and is an improvement on the structures described in my applications Serial No. 556,469, filed April 20, 1910, and Serial No. 566,069, filed June 9, 1910, both applications being entitled Sound recording apparatus.

My objects are the provision of an extremely sensitive sound recorder of simple construction, one which may be readily manufactured, and which is intended to record sounds both weak and strong more truly than has heretofore been possible.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 represents a vertical central cross section through a sound recorder embodying one form of my invention, and Fig. 2 is a bottom plan view thereof.

Referring to the drawings, the sound box 1 is provided with the diaphragm denoted generally by the reference character 2, formed of flexible material and preferably of acetyl cellulose, nitro-cellulose, cellulose xanthate (viscose cellulose), paper, or similar material, the porous structure of which permits of large flexing with very little power, as described in my application Serial No. 566,069 referred to. The diaphragm 2 is formed with an outer or edge annular flat portion 3 and a central circular portion 4 situated in a plane parallel to the edge portion 3 and joined thereto by the inclined annular portion 5, the diaphragm preferably being pressed into the desired shape from a disk of the material while hot, in a suitable die. The sound box 1 is provided with an annular knife edge 6 upon which the diaphragm is mounted adjacent the outer edge of edge portion 3 thereof. Preferably, a tubular washer 7 of small circular cross section and preferably of rubber is mounted in contact with edge portion 3 of

the diaphragm on the side opposite to knife edge 6, the parts being clamped or secured together by means of the ring 8 screw-threaded within the depending annular flange 9 of the sound box. The washer 7 at its median section is of the same diameter as the knife edge 6 and contacts the diaphragm in alinement with the knife edge, the diaphragm thereby being given an extremely sensitive support. The diaphragm is not secured to the sound box in any way except by being clamped adjacent to its edge between the knife edge and washer as described.

The diaphragm 2 should flex only or chiefly in the annular edge portion 3 between the knife edge support therefor and the inclined portion 5 of the diaphragm, and accordingly, the central portion 4 of the diaphragm should be stiffened in some manner. I prefer to use the construction illustrated in which a rigid member 10 is cemented or otherwise secured to the central portion 4 of the diaphragm. This member 10 is preferably circular, is given the form of an arch as shown, and is formed of any convenient light metal. The recording stylus 11 is carried by spring lever 12, the other end of which is secured to the sound box by screw 13. Lever 12 is joined to the center of rigid member 10 by the rigid connection 14 as shown. Lever 15 carrying tracking member 16 may be used if desired, the screw 17 being mounted in the sound box with its lower end bearing upon the upper side of the free end of lever 15 to adjust the vertical position of tracking member 16 to regulate the depth of cut permissible for recording stylus 11. The spring lever 12 may be given an upward flexure if desired, as described in my application Serial No. 556,469 referred to, in order to prevent excessive movement of the diaphragm and recording stylus in a direction away from the recording stylus under the influence of sound waves of great amplitude.

It will be seen that the structure described embodies an extremely sensitive diaphragm having a flexing annular outer portion and a non-flexing central portion integral therewith, flexure under the influence of sound waves being nearly entirely confined to the annular edge portion of the diaphragm, and the movement of the dia-

phragm as a whole being therefore similar to that of a piston.

It is obvious that my invention is not limited to the exact construction described, but that it may be modified or varied within the language of the appended claims without departing from the spirit of my invention.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:—

1. In sound recording apparatus, the combination of a flexible circular diaphragm having a single flat annular edge portion and a central circular portion located in parallel planes and directly connected by an annular portion inclined at an angle to said planes, means supporting said edge portion, a rigid member secured to said central portion adjacent the periphery thereof, a recording stylus rigidly connected to said rigid member, and means for applying an elastic pressure on the stylus and thereby imposing an initial stress on the diaphragm, substantially as described.

2. In sound recording apparatus, the combination of a flexible circular diaphragm having a single flat annular edge portion and a central circular portion located in parallel planes and directly connected by an annular portion inclined at an angle to said planes, a knife edge, means clamping said edge portion against said knife edge, a rigid member secured to said central portion adjacent the periphery thereof and a record-

ing stylus rigidly connected to said rigid member, substantially as described.

3. In sound recording apparatus, the combination of a flexible circular diaphragm having a single flat annular edge portion and a central circular portion located in parallel planes and directly connected by an annular portion inclined at an angle to said planes, a knife edge adapted to contact one surface of said edge portion adjacent the periphery thereof, a washer of small cross sectional area adapted to contact the opposite surface of said edge portion in alinement with said knife edge, means for clamping said parts together in the positions indicated, a rigid member secured to said central portion adjacent the periphery thereof, and a stylus rigidly connected to said rigid member, substantially as described.

4. As a new article of manufacture, a diaphragm of acetyl cellulose having a single flat annular edge portion and a circular central portion located in parallel planes and directly connected by an annular portion inclined at an angle to said planes, and a non-flexible circular member secured to said central portion adjacent the periphery thereof, substantially as described.

This specification signed and witnessed this 17th day of October 1910.

THOMAS A. EDISON.

Witnesses:

DYER SMITH,  
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



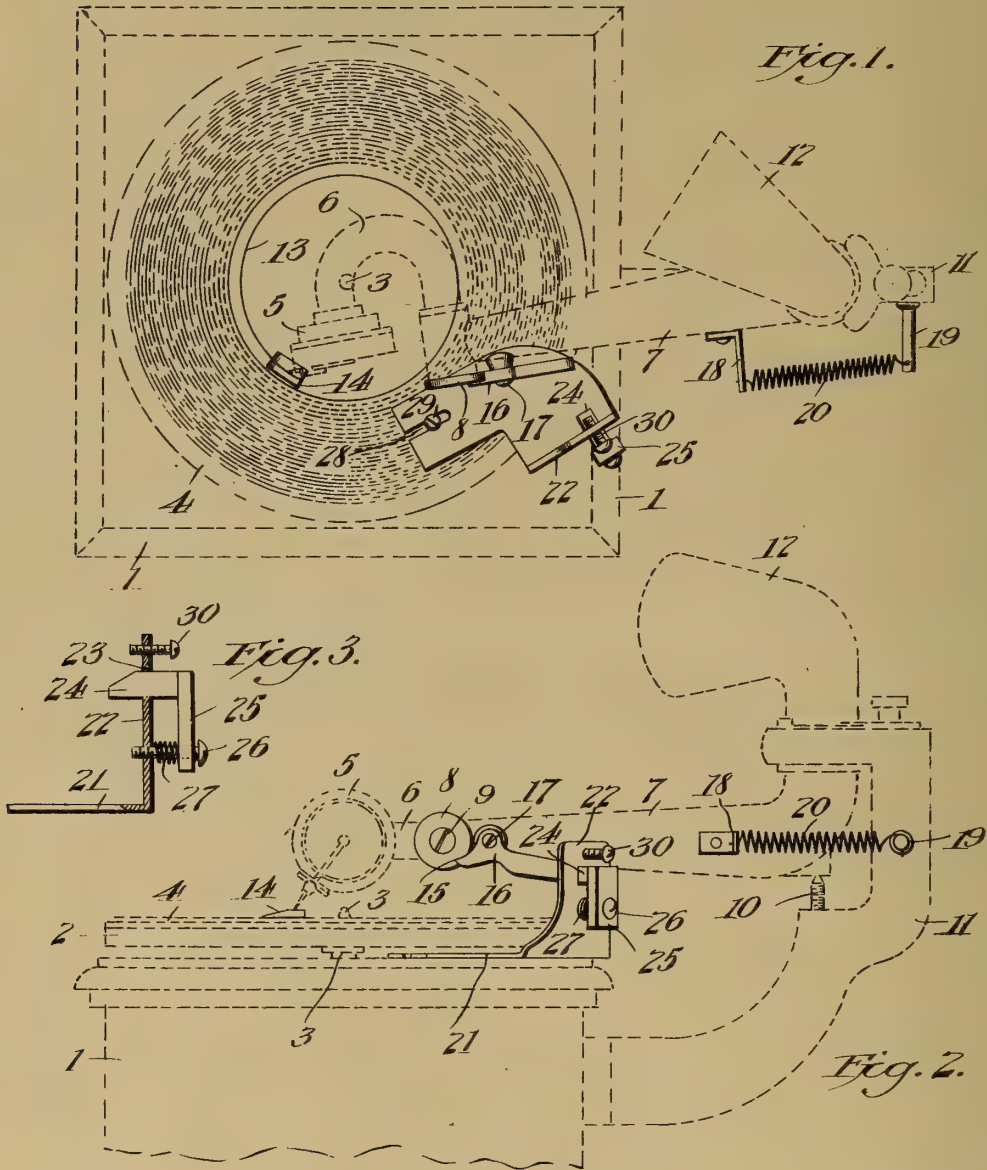
GRAPHOPHONE PATENT.

REPEATING GRAPHOPHONE,  
# 1,142,670-----C. Cameron,  
Patented-June 8, 1915.  
Filed-November 25, 1913.

C. CAMERON, JR.  
 REPEATING GRAPHOPHONE.  
 APPLICATION FILED NOV. 25, 1913.

1,142,670.

Patented June 8, 1915.  
 2 SHEETS—SHEET 1.



Witnesses:  
 T. L. Kockner  
 B. Rommers

Inventor:  
 Colin Cameron Jr.  
 by Henry Orth  
 Attorney

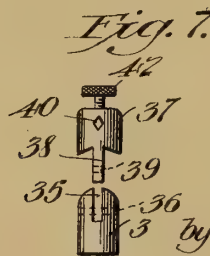
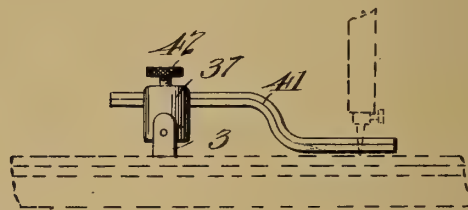
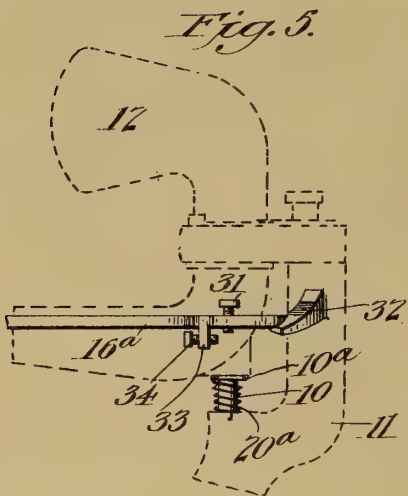
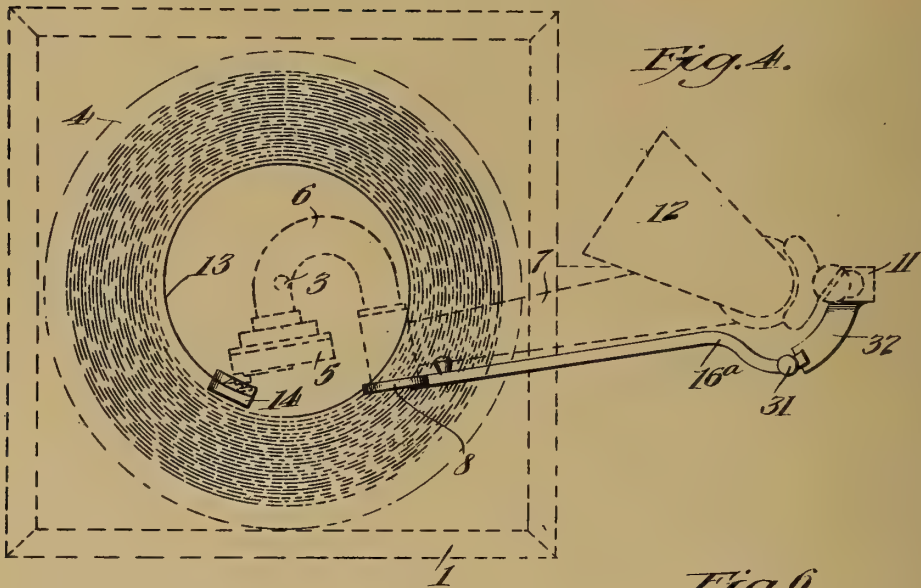




C. CAMERON, JR.  
 REPEATING GRAPHOPHONE.  
 APPLICATION FILED NOV. 25, 1913.

1,142,670.

Patented June 8, 1915.  
 2 SHEETS—SHEET 2.



Witnesses:  
 T. L. Knochel  
 J. W. Dommies

Inventor:  
 Colin Cameron, Jr.  
 Henry Orth, Jr.  
 Attorney

# UNITED STATES PATENT OFFICE.

COLIN CAMERON, JR., OF TUCSON, ARIZONA.

## REPEATING GRAPHOPHONE.

1,142,670.

Specification of Letters Patent.

Patented June 8, 1915.

Application filed November 25, 1913. Serial No. 802,960.

*To all whom it may concern:*

Be it known that I, COLIN CAMERON, Jr., a citizen of the United States, residing at Tucson, Pima county, Arizona, have invented certain new and useful Improvements in Repeating Graphophones; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to graphophones, and more particularly to repeating graphophones, and has for its object to provide simple and efficient mechanism whereby the production on the disk, whether music, song or speech, will be automatically repeated, the number of repeats being simply dependent upon the length of time that the usual motor of the graphophone will operate.

Referring to the drawings, in which like parts are similarly designated, Figure 1 is a plan view of a graphophone provided with a repeating mechanism embodying my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a detail of a cam for tripping the holding pawl. Fig. 4 is a plan view of a modification showing the tripping cam as mounted on the horn-supporting bracket. Fig. 5 is an enlarged elevation of a portion of Fig. 4. Fig. 6 is a further modification, and Fig. 7 shows the method of attaching the modification shown in Fig. 6 to the post or spindle.

The invention is shown applied to a well-known form of graphophone, or disk talking machine, wherein 1 is the case or box containing the driving mechanism for the table 2, mounted on a vertical spindle 3, and rotated by said driving mechanism. The spindle 3 projects above the table, and over this projecting end is placed the customary disk 4. The sound box 5 is mounted on a U-shaped tube 6, said tube 6 being journaled in or mounted to rotate in the end of the sound arm 7.

The U-shaped tube 6 is held in the end of the arm 7 by a retaining washer 8 held in place by a screw 9, and the sound arm 7 is mounted on a pivot point 10 in a supporting bracket 11 attached to the side of

the case or box 1. The sound arm communicates with the usual horn, 12.

The parts just described are the parts of existing machines and are well known in the art, and require no further description.

In order to make such an apparatus automatically repeat, it is necessary first to lift the sound box, so as to remove the needle from the record, and this I do by means automatically coming into action to rotate the sound box 5 and the U-tube 6 in the end of the sound arm 7, and I also provide means for holding the needle lifted. This prevents the needle from being dragged transversely of the convolutions of the phonic line of the disk 4. The sound box must be held so elevated until it has passed across the record, and must then be released at or near the beginning of the phonic line.

In order to lift the needle from the record the phonic line is continued, as shown at 13, Fig. 1, in a spiral of greater curvature or pitch than the usual talking portion of the phonic line and is continued onto an incline or lug 14, so that the needle at the end of the playing of the piece, will follow the line 13 and ride up onto the lug or projection 14, and in so doing lift the sound box and cause the U-tube 6 to rotate slightly, and with it the washer or disk 8.

The washer 8 is provided with a lug or notch 15 constructed to be engaged by the nose of a pawl 16 pivoted at 17 on the sound arm. The tail of this pawl 16 is longer than its nose, and operates as a weight to urge the nose of the pawl against the edge of the washer 8 and into the notch 15.

As soon as the sound box has been lifted by the needle riding up onto the projection 14, the U-tube 6 and washer 8 of course moving with it, said washer rotates sufficiently to permit the nose of the pawl 16 to enter the notch 15, so that when the lug 14 on the disk 4 has passed from under the needle the sound box will be maintained lifted. The delicately pivoted sound arm 7 is then free to be swung on its pivot 10 without harm to the record.

In order to accomplish this swinging movement I attach to the sound arm 7 a bracket 18, and also attach to the horn supporting bracket 11 a post 19, and between the bracket 18 and post 19 I place a fine coiled spring 20. This spring pulls the



sound arm 7, together with the sound box held elevated by pawl 16, toward the periphery or starting portion of the phonic line. It now becomes necessary to stop the swing of the arm 7 and to release the pawl from its notch 15, to allow the sound box to drop and place the needle in position at or near the beginning of the record.

On the case 1 I mount a bracket 21 having an upright portion 22 provided with a perforation 23 through which projects a cam 24 having a depending arm 25 through which passes a screw 26, screwed into the upright portion 22 of the bracket. A light spring 27 surrounds screw 26 between the portion 22 of the bracket and arm 25 of the cam. This structure of cam is slightly yielding by reason of the spring 27. The bracket 21 is provided with a slot 28 in its foot portion, whereby it is secured to the case or box 1 by means of a screw 29, so that by adjusting the bracket 21 with respect to screw 29 a rough adjustment of the cam 24 with respect to the disk may be made. The degree to which the cam 24 will yield may be adjusted by means of screw 26, which, when screwed into the portion 22 will increase the pressure of spring 27, and, vice versa, when unscrewed, the portion 22 will decrease the pressure of spring 27.

The tail of the pawl 16 rides on the inclined surface of the cam 24, and in doing so the tail of the pawl is cammed upward whereby its nose is released from its notch 15, and the sound box drops down, so that the needle will engage the initial portion of the phonic line.

In order to prevent the sound arm from swinging too far toward the periphery of the disk and beyond the sound record thereon, and to insure the sound box being released at the proper point, I provide a stop 30, against which the side of the tail of the pawl 16 will strike. Should the sound arm and pawl be swung over against a rigid stop 30 a rebound may occur, and this rebound will prevent the sound box from dropping at the proper point, and it is for this reason that I provide a yielding cam 24, so that when the tail of the pawl strikes the cam 24 it will yield to a certain extent, sufficient to prevent the rebound of the sound arm, thereby cushioning the sound arm as it moves against the absolute or rigid stop 30, and at the same time the cam 24 will lift the tail of the pawl. Proper adjustment of the stop 30 and the tension of spring 27 can readily be done after a few trials. As soon as the needle has dropped into the beginning of the phonic line the piece is re-played, until the needle rides upon the lug or projection 14 on the record. For double-faced records there is a projection 14 on each side thereof, and it is self-evident that it is necessary to provide a recess in the table 2 for the

reception of the lug on the under face of the record, in order that the record may lie flat on the table.

In the modification shown in Fig. 4, the tail of the pawl 16 is extended all along the sound arm 7, as shown at 16<sup>a</sup>, and is provided with a set-screw 31 arranged to ride on a cam surface 32 made integral with or secured to the horn supporting bracket 11. The cam 32 has but a slight rise, and by reason of this it is not provided with a yielding surface. The bottom of the arm carries a depending lug 33, in which is a set-screw 34 that takes against the squared end of the cam 32, to provide an absolute limit for the swing of arm 7 and to prevent said arm from swinging past the initial turn of the phonic line. The spring for returning the sound arm 7 to initial position, in this construction is wound around the pivot pin 10 for the arm, one end of the spring, here shown as the lower end, being secured in the bracket 11, and the other end to a washer 10<sup>a</sup>; or it may be that the upper end of spring 20<sup>a</sup> is secured to the sound arm in any convenient manner. I have found, however, that the weight of the sound arm on the washer 10<sup>a</sup> is sufficient to cause the sound arm to travel back to its initial position.

In Fig. 6 I have shown an attachment for tripping the sound box, which consists of simply slotting the top of the spindle 3 at 35, and drilling a hole transversely to the slot at 36. I then provide a cap piece 37 having a rib 38 arranged to enter the slot 35, said flange 38 having a hole 39 in register with the slot 36. The cap piece is also provided with a square hole 40 for the reception of a rod 41 held in place in the cap piece by a set screw 42. The rod 41 is bent so that its free end lies close to the record. The rod is perfectly square, or is provided with a beveled surface having approximately the same incline as the needle, so that when this rod rides under the needle it will lift the sound box in the same manner that the projection 14 lifts it. Any other manner of securing the tripping rod 41 to the spindle 3 may be used, it simply being essential that the rod or other tripping device travels with the spindle or table, that is to say, the tripping means travels under the needle and in so doing lifts it.

Of course the springs 20 and 20<sup>a</sup> produce a slight lateral pressure of the needle point against the sides of the record groove. This, apparently, would be objectionable, but the sound arms of graphophones are very delicately pivoted and the spring 20 is made of very fine wire, so that this lateral pressure is immaterial, and I have found that the records will wear just as well as those on which the repeating device is not used.

It will be noted that I have illustrated my invention in connection with a machine hav-



ing a horn, but it can be used equally as well with any type of disk machine.

I claim—

1. In a graphophone, the combination  
5 with a sound arm movable about a vertical pivot, a sound box on said arm, a needle in the sound box, and a rotatable record engaged by and cooperating with the needle to swing said arm on its pivot, of means to  
10 lift the needle and thereby the sound box from the record at the end of the reproduction, means on the sound arm to maintain the sound box lifted, means to return the sound arm and sound box to initial position,  
15 and means to release the sound box.

2. In a graphophone, the combination with a sound arm movable about a vertical pivot, a sound box on said arm, a needle in the sound box, and a rotatable record engaged by and cooperating with the needle  
20 to swing said arm on its pivot, of means moving with and at a speed equal to the speed of the record to lift the needle and thereby the sound box from the record at  
25 the end of the reproduction, means on the sound arm to maintain the box lifted, means to automatically swing the sound arm and sound box to initial position, and means to automatically release the sound box to  
30 cause the needle to again engage the record.

3. In a graphophone, the combination with the sound arm, the sound box journaled thereon and the record supporting table; of means movable with the table to  
35 trip the sound box, means on the sound arm to hold the sound box tripped, means to automatically swing the arm across the record, means in the path of the sound box holding means to release the holding means  
40 and means to adjust the time when said holding means is released.

4. In a graphophone, the combination with the sound arm thereof, the sound box journaled thereon and the record support;  
45 of means movable with the record support to trip the sound box, means on the sound arm to hold the sound box tripped, a spring to automatically swing the arm across the record and a cam to trip the holding means.

5. In a graphophone, the combination with the sound arm, the sound box journaled thereon, its needle and the disk supporting means; of a disk on the latter having a projection onto which the phonic line  
55 of the disk is continued, by which the sound box is raised when its needle rides over the same, a pawl to hold the sound box in its

raised position, a spring to return the sound arm to initial position and an adjustable cam in the path of the pawl for releasing it. 60

6. In a graphophone, the combination with the record carrier, the sound arm and the sound box journaled thereon; of means to lift the sound box with respect to the arm, a pawl to hold said box in raised position, a spring to return the arm to initial position, an adjustable yielding cam for  
65 simultaneously tripping said pawl and retarding or damping the swing of the arm near the limit of its swinging movement, 70 and an adjustable stop for limiting the swing of the arm.

7. In combination, a phonographic record, a sound arm, a sound box journaled thereon, a needle in the box, said record having a projection onto which the phonic line is extended said projection adapted to be engaged by the needle to trip the sound box, means carried by the arm to hold the box tripped after the needle has passed said  
80 projection and means to return the arm to initial position. 75

8. In combination, a phonograph record, a sound arm, a sound box journaled thereon, a needle in the box, said record having an incline projecting from its face onto which the phonic line is extended at greater pitch and adapted to be engaged by the needle to trip the sound box, means to hold the latter tripped after the needle has passed said projection, means to return the sound arm to initial position, and means to release the sound box at starting position. 90

9. In combination, a phonograph record, a sound arm, a sound box journaled thereon, a needle in the box, said record having an incline projecting from its face onto which the phonic line is extended at greater pitch and adapted to be engaged by the needle to trip the sound box, means to hold the latter tripped after the needle has passed said projection, means to return the sound arm to initial position, an adjustable bracket, and a yielding stop mounted in the bracket for raising the holding means for the sound  
105 box. 100

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

COLIN CAMERON, JR.

Witnesses:

J. F. MCGILL,  
HENRY MILLER.

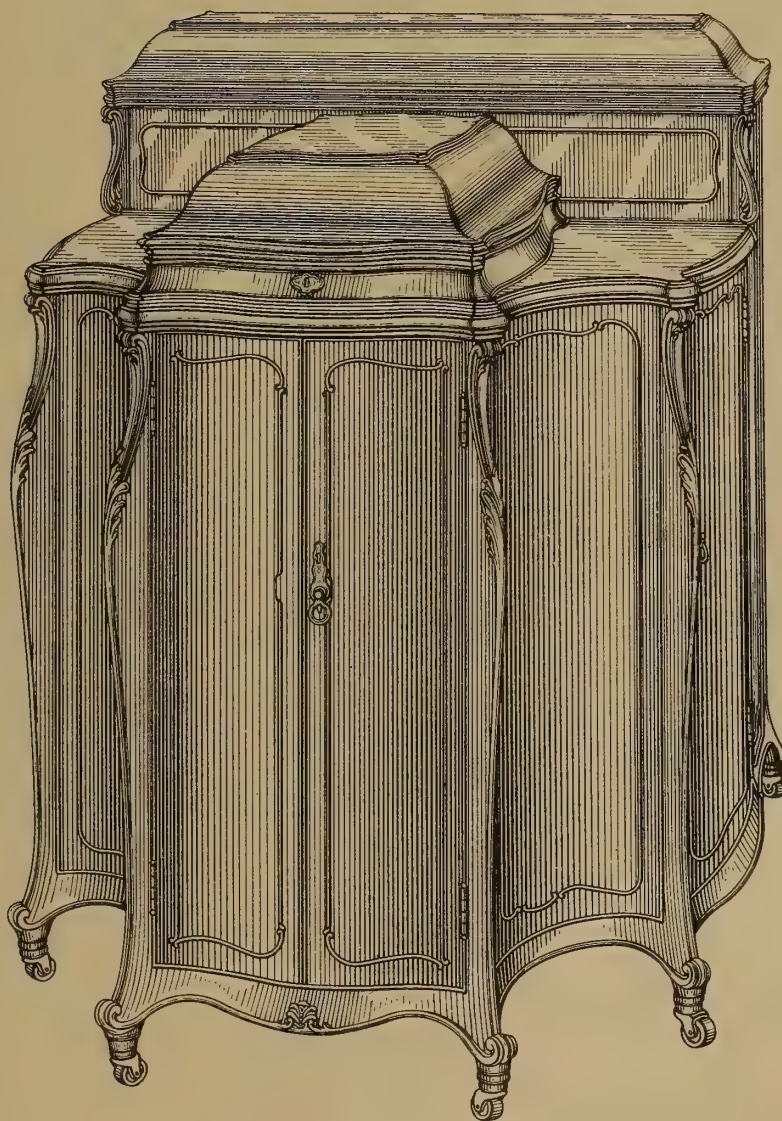


DESIGN.

E. R. JOHNSON & E. T. KIEFFER.  
CABINET FOR TALKING MACHINES.  
APPLICATION FILED MAR. 30, 1915.

47,398.

Patented June 1, 1915.



WITNESSES

*W. J. Hartman.*

*Eugene N. Heller.*

BY

INVENTORS  
*Eldridge R. Johnson,*  
*Eugene T. Kieffer.*

*Kraton & Blount*

ATTORNEYS





# UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, AND EUGENE T. KIEFFER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

DESIGN FOR A CABINET FOR TALKING-MACHINES.

47,398.

Specification for Design.

Patented June 1, 1915.

Application filed March 30, 1915. Serial No. 18,186. Term of patent 14 years.

*To all whom it may concern:*

Be it known that we, ELDRIDGE R. JOHNSON, a resident of Merion, county of Montgomery, State of Pennsylvania, and EUGENE T. KIEFFER, a resident of the city of Philadelphia, county of Philadelphia, State of Pennsylvania, and both citizens of the United States, have invented a new, original, and ornamental Design for Cabinets for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The figure is a perspective view of a cabinet for a talking machine showing our new design.

We claim:

The ornamental design for a cabinet for a talking machine, as shown.

ELDRIDGE R. JOHNSON.  
EUGENE T. KIEFFER.

Witnesses as to signature of Eldridge R. Johnson:

EDWARD K. MACEWAN,  
RALPH L. FREEMAN.

Witnesses as to signature of Eugene T. Kieffer:

MARGUERITE McFALLS,  
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# THE HISTORY OF THE

REIGN OF KING CHARLES THE FIRST

IN WHICH ARE CONTAINED THE  
MOST IMPORTANT PASSES OF HIS REIGN

FROM HIS ASCENSION TO THE THRONE  
UNTIL HIS DEATH

BY SAMUEL JOHNSON  
OF ST. JOHN'S COLLEGE, OXFORD

LONDON: Printed by J. DODD, in Pall-mall, 1764.



**DESIGN.**

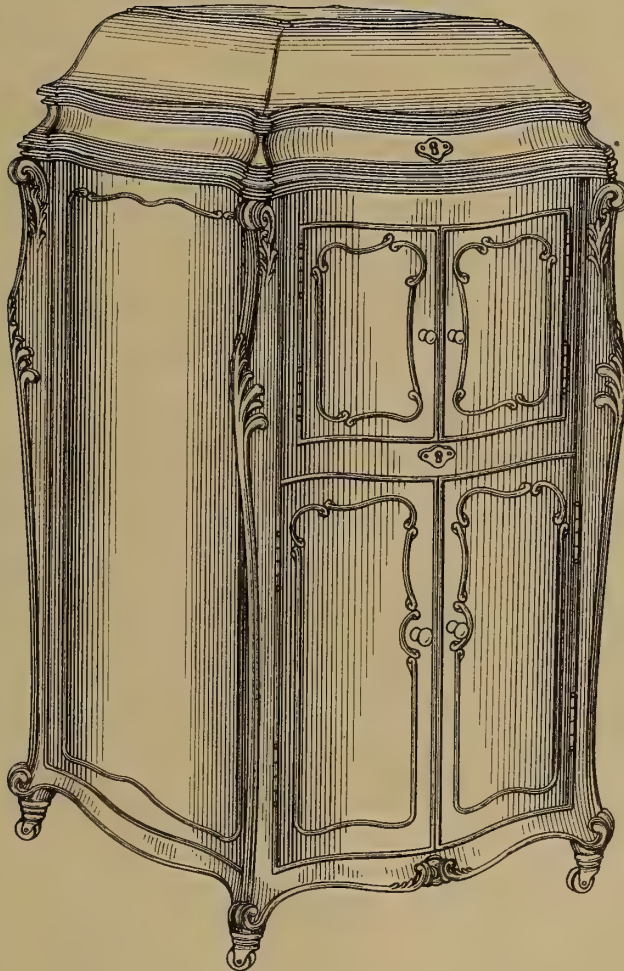
**E. T. KIEFFER.**

**CABINET FOR TALKING MACHINES.**

APPLICATION FILED FEB. 11, 1915.

**47,399.**

**Patented June 1, 1915.**



WITNESSES

*H. G. Hartmann.*  
*Eugene T. Kieffer.*

BY

INVENTOR

*Eugene T. Kieffer.*

*Fraser & Blount.*

ATTORNEYS



# UNITED STATES PATENT OFFICE.

EUGENE T. KIEFFER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

DESIGN FOR A CABINET FOR TALKING-MACHINES.

47,399.

Specification for Design.

Patented June 1, 1915.

Application filed February 11, 1915. Serial No. 7,602. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, EUGENE T. KIEFFER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new, original, and ornamental Design for Cabinets for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The figure is a perspective view of a cabinet for a talking machine showing my new design.

I claim:

The ornamental design for a cabinet for a talking machine, as shown.

EUGENE T. KIEFFER.

Witnesses:

MARGUERITTE McFALLS,  
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



# THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA

FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME

BY JAMES M. SMITH

IN TWO VOLUMES

VOLUME I

NEW YORK

1850

*filed*  
GRAPHOPHONE PATENT.

SOUND BOX FOR TALKING MACHINES,  
# 1,142,883-----e--A. D. Jones,  
Patented-June 15, 1915.  
Filed-April 14, 1913.  
RENEWED-November 6, 1914.

A. D. JONES.

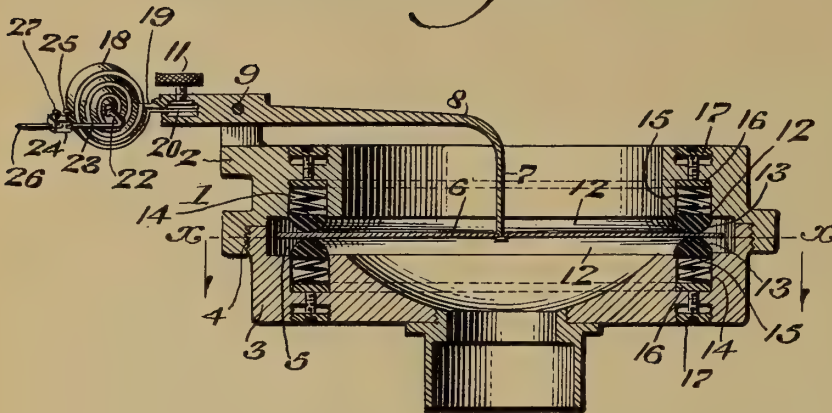
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED APR. 14, 1913. RENEWED NOV. 6, 1914.

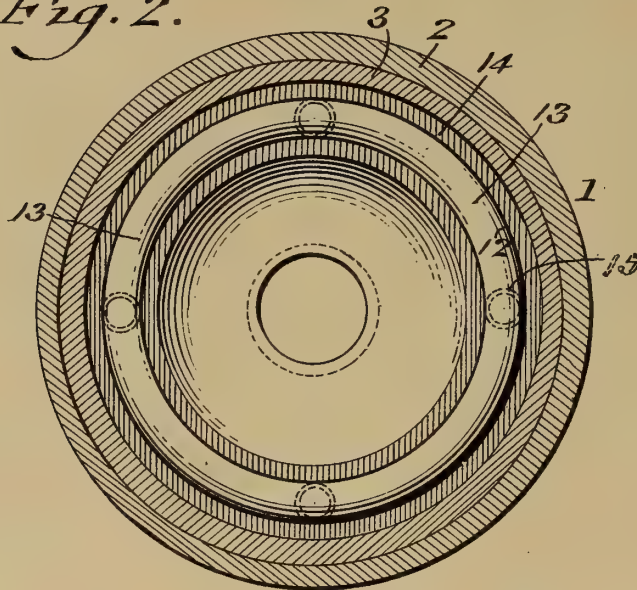
1,142,883.

Patented June 15, 1915.

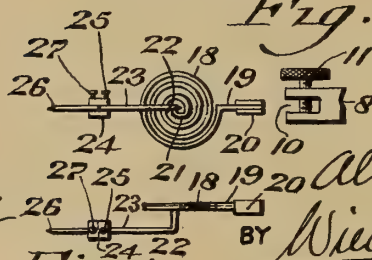
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



WITNESSES

*O. F. Nagle*

*H. F. Dieterich*

INVENTOR

*Alva S. Jones*

BY

*Wiedersheim & Kurbann*

ATTORNEYS



# UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

## SOUND-BOX FOR TALKING-MACHINES.

1,142,883.

Specification of Letters Patent.

Patented June 15, 1915.

Application filed April 14, 1913, Serial No. 761,001. Renewed November 6, 1914. Serial No. 870,696.

*To all whom it may concern:*

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box for Talking-Machines, of which the following is a specification.

My invention relates to a novel construction of a sound box for talking machines, graphophones and other sound recording and reproducing machines and its object is to improve the construction of the recording and reproducing mechanism particularly that part known as the sound box and stylus supporting bar, whereby the sound delivered from the diaphragm is greatly improved and a clear and distinct articulation obtained, provision being made for the diaphragm to be yieldingly supported in the box so that it has capacity for vibration adjacent to its perimeter as well as at its center, the sound box and its adjuncts being inexpensive to construct, sensitive in action, easily and quickly repaired and readily accessible for the purpose of inspection or replacement of parts, means being thus provided for a general improvement of the tones, amelioration of the scratchy metallic or grinding sounds common in instruments of this class and for developing the delicate sounds ordinarily difficult to reproduce.

My invention further consists of a novel construction of stylus support embodying broadly the combination of a stylus and a convoluted or resilient support therefor, whereby the requisite freedom of vibration in every direction is imparted to the stylus under all conditions to accommodate or compensate for all inequalities or depressions in the groove of the disk with which the stylus coacts, whereby there is produced a general improvement of the tone reproduced and an elimination of the scratching and metallic harshness heretofore existing.

To the above ends my invention consists of a novel construction of sound box and a novel construction of resilient convoluted support for the stylus, the novel features of which will be hereinafter fully set forth and particularly pointed out in the claims.

It further consists of other novel features of construction all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at pres-

ent preferred by me, since the same will be found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a sectional view of a sound box embodying my invention. Fig. 2 represents a section on line  $x-x$  Fig. 1. Fig. 3 represents a side elevation showing the stylus and its convoluted resilient support in detached position. Fig. 4 represents a front elevation of Fig. 3.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates my novel construction of sound box, the same comprising the members 2 and 3, which are preferably held in threaded engagement, as indicated at 4, or other suitable assembling means may be employed. The juxtaposed faces of the sound box members 2 and 3 are recessed, so as to provide a diaphragm chamber 5 when assembled, within which is located a diaphragm 6, the latter having attached to its central portion the member 7 of the stylus supporting bar or arm 8, which is fulcrumed at 9 and provided with a socket 10 at its extremity, within which either an ordinary stylus or my novel stylus supporting member may be secured by means of the fastening device 11 or its equivalent. The diaphragm 6 is of slightly less diameter than the diameter of the diaphragm chamber 5, so that its outer perimeter is capable of vibration, and the diaphragm is secured in position by means of the juxtaposed resilient rings 12, said rings or annuli having the juxtaposed convex faces 13, between which the diaphragm 6 is secured, as will be understood from Fig. 1. Each of the annular rings 12 is seated in annular juxtaposed grooves 14 in the sound box members which are of sufficient depth to receive a portion of said rings and permit a slight play thereof so that the requisite amount of play or vibrancy may be permitted to the inner as well as the outer or peripheral portion of the diaphragm, the rings 12 being pressed toward each other or against the diaphragm by means of the springs 15, which are preferably four or more in number, and spaced apart at the desired intervals, as will be

understood from Fig. 2, the tension of said springs being adjusted according to requirements by means of screws 17, whose inner extremities bear upon the annular flat fol-  
 5 lower plate or ring 16, which is preferably made of hard rubber and is of substantially the same diameter as the annular rings 12, which are preferably made of soft rubber or resilient material. By screwing the screws  
 10 17 in or out against the annular follower ring or plate 16, which can be readily done with an ordinary screw driver, it will be seen that the tension of the springs can be regulated according to requirements. If de-  
 15 sired cushions of any resilient material may be employed in lieu of the springs 15.

In Fig. 3 I have shown in detached position my novel construction of stylus support, the same comprising a convoluted flat or  
 20 round spring or resilient member 18, one terminus 19 of which is provided with the head 20 which is adapted to engage the seat or socket 10 and is held in position by means of the fastening device 11 or its equivalent.  
 25 The inner end 21 of the convoluted or resilient member 18 is slightly off-set, as indicated at 22, and terminates in the member 23 carrying the chuck or holder 24 secured in position by screw 25.

26 designates a stylus point of the ordinary construction which is secured in the holder 24 by means of the fastening 27 or its equivalent.

The general operation of sound boxes for  
 35 talking machines is well understood by those skilled in the art and need not be described in detail. It will, however, be understood that the sound box seen in Figs. 1 and 2 can be employed in conjunction with an ordi-  
 40 nary stylus, or if desired the stylus holder seen in Figs. 3 and 4 may be employed. In either case the stylus or needle 26, when brought into engagement with the sound grooves of the usual disk tablet will upon  
 45 rotation of the latter cause the vibrations to be communicated from the sound record through the needle 26 and arm 8 to the diaphragm 6 and the sounds are thus reproduced. As the two members 2 and 3 of the  
 50 sound box are screwed together into assembled position, the resilient rings 12 will be caused to seat sufficiently in their annular recesses, so as to be retained in position and by adjusting the screws 17 against the an-  
 55 nular flat follower ring or plate 16, the pressure of the juxtaposed rings 12 upon the opposite sides of the diaphragm can be regulated according to requirements. By the employment of the curved or convex jux-  
 60 taposed faces 13 upon the annular rings 12, the requisite tight joint is formed between the diaphragm and its supporting devices so that there is no possibility of the escape of air around the outer edge of the dia-  
 65 phragm. It will thus be apparent that in

vibrating the diaphragm not only will the center be vibrated, but the periphery of the diaphragm will also have more or less free vibration in a direction at a right angle to the plane of the diaphragm. I have thus  
 70 produced a floating diaphragm, which is free to be moved bodily in the desired or requisite directions by the stylus bar, and by the proper adjustment of the springs 15, or by making said springs of the desired  
 75 tension, I have devised a structure capable of reproducing a tone rich in quality, with the elimination of metallic grinding or scratchy sounds so common in instruments of this class. It will be further understood  
 80 that by the employment of the stylus holder seen in Figs. 3 and 4, I attain a very sensitive and faithful reproduction from the sound grooves of the record, it being ap-  
 85 parent that by reason of the member 23 being out of contact with the convolutions 18, by reason of the offset portion 22, said convolutions are enabled to absorb all of the secondary sounds which occur, and in addition to augment in a marked degree the  
 90 sounds reproduced from the record.

It will be apparent that I may employ a flat coiled or convoluted spring, as seen in Fig. 1, or, if desired, I may make the convoluted or spiral stylus holder of round  
 95 metallic or similar material, preferably steel wire which may be properly tempered and provided with the requisite spirals or convolutions according to requirements.

By the employment of the spiral or con-  
 100 voluted stylus holder, it will be apparent that I have eliminated the usual mechanism employed to take care of the side thrust upon the stylus, caused by the sound grooves or grooves produced by the sound waves in the  
 105 making of the record. In certain types of records it is a well known fact that the sound waves produce a line or groove in the surface of the disk which varies in depth, and for an increased volume of sound, the depth  
 110 of the groove is increased, so that it will be seen that my spiral or convoluted resilient stylus holder will allow the point of the stylus to freely follow the shallower and deeper portions of the bottom of the groove,  
 115 and the stylus can thus readily accommodate itself to either side or up and down movement without enlarging, impairing or injuring the groove of the record in any way, and by reason of its spiral shape it will re-  
 120 produce a sound wave more perfectly than any other form of stylus holder with which I am acquainted.

It will be further observed that by my employment of two rings 12, one on either  
 125 side of the diaphragm 6, which encompass its complete circumference on a line concentric with the diaphragm center, said rings among other important functions serve the function of a muffler as they are of a soft  
 130



resilient material which serves as a non-conductor of sound waves. By my invention the usual harsh, dead and mechanical sounds produced from the diaphragm of a sound box resting on a solid ledge or support have been overcome and substantially perfect reproductions of the human voice are attainable by my novel sound box, in combination with my novel spiral stylus holder.

It will now be apparent that I have devised a novel and useful construction of a sound box for talking machines which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the character stated, a sound-box having a diaphragm chamber and annular grooves in the opposed faces of said chamber and near the edges of the same, yielding rings in said grooves and having convex opposed sides, a floating diaphragm interposed between said rings, annular followers in said grooves, and cushioning devices interposed at intervals between said rings and followers.

2. In a device of the character stated, a sound-box having a diaphragm chamber and annular grooves in the opposed faces of said chamber and near the edges of the same, yielding rings in said grooves and having convex opposed sides, a diaphragm interposed between said rings, annular followers in said grooves, cushioning devices interposed at intervals between said rings and followers, and adjusting devices located to bear at intervals against said followers.

3. In a device of the character stated, a sound box comprising a pair of members detachably secured together and having a diaphragm chamber therein, said members having annular grooves therein, resilient annular rings located in said grooves and

having convex juxtaposed faces, a diaphragm located in said chamber and secured in position between said convex faces, an annular follower plate seated in the base of each of said grooves, cushioning devices interposed between said plates and said diaphragm supporting rings, and adjusting devices for said follower plates.

4. In a device of the character stated, a sound-box having a diaphragm chamber and annular grooves in the opposed faces of said chamber and near the edges of the same, yielding rings in said grooves and having convex opposed sides, a diaphragm interposed between said rings, annular followers in said grooves, cushioning devices interposed at intervals between said rings and followers, and adjusting devices located to bear at intervals against said followers and accessible from the exterior of said box.

5. In a device of the character stated, a stylus support comprising a convoluted resilient member having an offset portion projecting from an inner convolution thereof, and means carried thereby for supporting a stylus.

6. In a device of the character stated, a stylus device comprising a resilient and flat helical portion adapted to have its end connected to the diaphragm of a sound-box, and a portion laterally offset from the inner convolution of said helical portion to extend radially at the side of the same and to have a stylus at its outer end.

7. In a device of the character stated, a stylus support comprising a resilient and flat helical portion having its outer end projecting to be secured in a stylus bar, and a straight portion laterally offset from the inner convolution of said helical portion to extend outward at one side of the same and having a stylus-clamp at its outer end.

8. A sound box comprising a plurality of members having annular grooves therein, follower plates in said grooves, annular rings located in said grooves and having convex juxtaposed faces, a diaphragm located between said convex faces, and cushioning devices between said plates and rings.

ALVA D. JONES,

Witnesses:

E. HAYWARD FAIRBANK,  
C. D. McVAY.





GRAPHOPHONE PATENT.

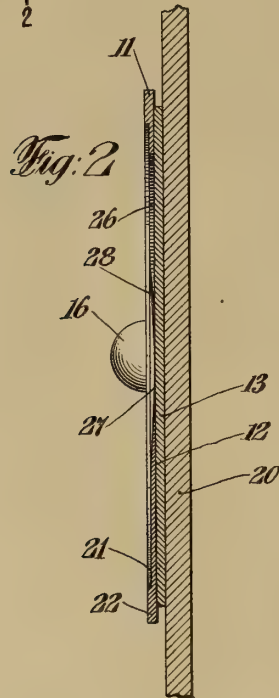
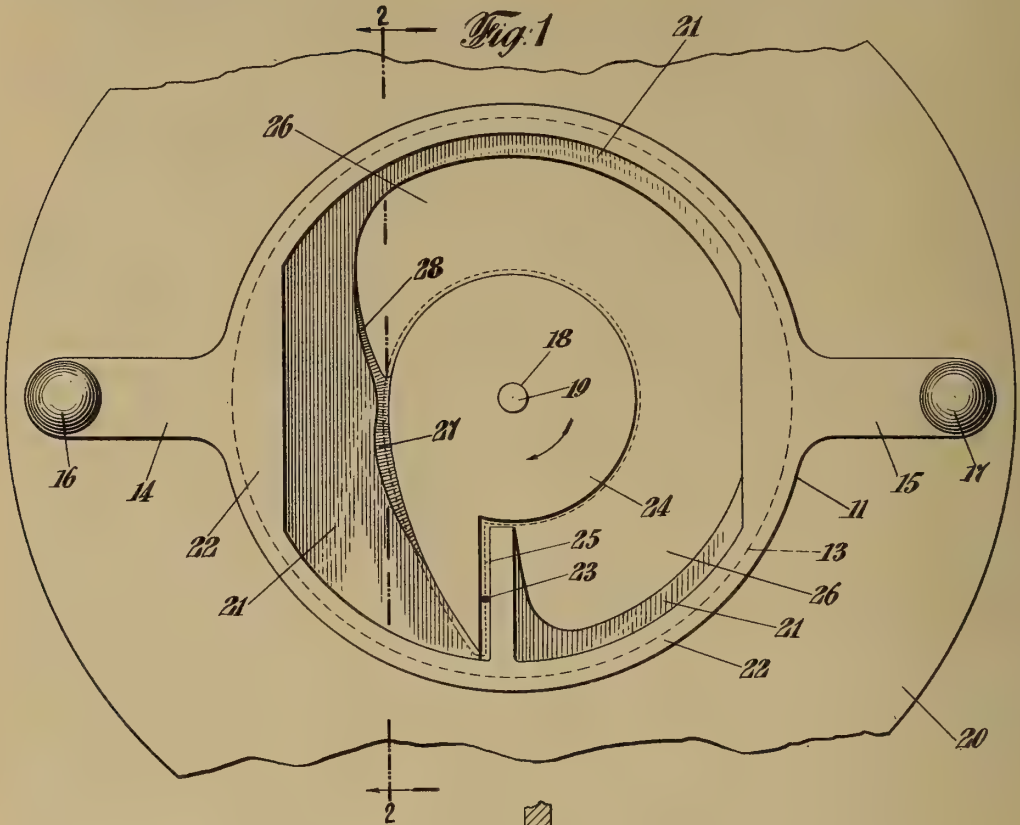
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REPEATING DEVICE FOR TALKING MACHINES,  
# 1,143,289-----F. S. Leisenring,  
Patented-June 15, 1915.  
Filed-February 15, 1915.

F. S. LEISENRING.  
 REPEATING DEVICE FOR TALKING MACHINES.  
 APPLICATION FILED FEB. 15, 1915.

1,143,289.

Patented June 15, 1915.



WITNESSES

*John E. Prager*  
*Julien S. Rehm.*

INVENTOR

*Frank S. Leisenring*

BY

*Frank F. Schuette*  
 ATTORNEY



# UNITED STATES PATENT OFFICE.

FRANK S. LEISENRING, OF FLUSHING, NEW YORK.

REPEATING DEVICE FOR TALKING-MACHINES.

1,143,289.

Specification of Letters Patent.

Patented June 15, 1915.

Application filed February 15, 1915. Serial No. 8,198.

*To all whom it may concern:*

Be it known that I, FRANK S. LEISENRING, a citizen of the United States, and a resident of Flushing, in the county of Queens and State of New York, have invented certain new and useful Improvements in Repeating Devices for Talking-Machines, of which the following is a specification.

The invention relates to a repeating device for talking machines and more particularly to devices of this character which shall be suitable for use with talking machines of the disk record type.

It has for its object to provide a simple device of this character which may be manipulated by even the most unskilled operator and whereby the record will be repeated without further attention to the talking machine, said device, furthermore, being of such a character as not to mar the general appearance of the machine nor injure the needle and record. The repeater is simple and positive in its action, being so designed that it need not be attached to the machine proper but merely fitted over the positioning pin of the usual turn table, resting lightly upon the record but exerting no appreciable retarding action on the driving motor. The use of the improved repeater does not affect the reproduction of the tone and affords a means for almost instantaneously returning the reproducing needle to its initial position after the completion of the record, whereupon the record is repeated indefinitely and without any attention whatsoever until the driving motor of the talking machine runs down.

The nature of the invention will be best understood when described in connection with the accompanying drawings, in which—

Figure 1 is a plan of the improved repeating device. Fig. 2 is a vertical section through the repeater and a portion of the machine and taken on the line 2—2, Fig. 1.

Similar characters of reference designate corresponding parts throughout the several views.

Referring to the drawings, 11 designates a disk of suitable material, for example, celluloid or other plastic material, or alumi-

num—in fact, any material of sufficient lightness and smoothness to insure that no excessive friction will exist between the flat, smooth underface 12 of said disk and the top of the record 13. The disk 11 is provided with diametrically opposed arms 14 and 15 of equal length extending from the circumference thereof, said arms being provided at the ends with equally weighted portions 16 and 17 respectively. The radii of said arms and the mass mounted at their ends are in accordance with certain conditions necessary for the operation of the repeater and as will be hereinafter set forth. A central circular opening 18 is provided in the said disk to admit of the same being placed over the positioning pin 19 of the turn-table 20. The upper surface of disk 11 is provided with a portion 21 which is depressed a suitable depth beneath the annular surface portion 22, which latter thus forms a barrier to prevent the reproducing needle 23 from jumping over the disk. A central barrier 24 is also provided, its upper surface being preferably flush with the surface 21 and for approximately 270° it is circular, the circular portion beginning substantially at the end of a slot 25 which extends inwardly from the annular barrier 22 toward the central barrier 24. The slot opens into a cut-away portion 26 of the disk and which extends to the end of the circular portion of barrier 24. In this slot the needle 23 is adapted to ride and to hold, normally, the said disk 11 against rotation due to the slight frictional engagement between its underface and the surface of the record 13. At the termination of the circular portion of barrier 24, the said barrier develops into an Archimedean spiral or other suitable smooth path which extends for the remaining quadrant and terminates at the outer end of slot 25. A portion 27 of the surface 21 adjoining the beginning of this spiral barrier as well as a portion 28 somewhat in advance is inclined toward the surface of the record, the inclination being of suitable pitch to enable the needle to ride freely up thereon as will hereinafter be set forth. The remaining portion of said surface adjoining the barrier is preferably level but may be raised



or otherwise altered to suit the conditions, it being understood that the two barriers converge to the outer end of the slot 25.

To operate the repeater, it is necessary merely to fit the disk 11 over the pin 19 and place the needle 23 in its initial position at the outer end of the slot 25, the disk generally being of such diameter as to extend slightly beyond the reproducing convolutions of the record disk 13. As but a slight frictional contact exists between the smooth under face 12 of the disk and the record 13 upon which it rests, the needle 23 will readily hold back said disk against rotation and without experiencing appreciable stress. This condition will obtain until the said needle reaches the end of slot 25 and which corresponds to the end of the selection of the record. As the disk 11 is then no longer restrained by said needle, it will rotate practically instantaneously (in the direction indicated by the arrow) under the action of the rotating record 13, and will then cause the said needle to ride upon the inclined portion of the surface 21 adjoining the spiral portion of the barrier 24, or possibly upon the inclined portion 28, choosing the shortest and most natural path. In Fig. 1 of the drawings the general path of the needle relatively to the disk 11 is indicated by dashes. In any event the needle will, under the guidance of the barrier portion 22 or 24, be returned to its initial and starting position in slot 25 and the cycle repeated. The function of the weighted arm members 14 and 15 is to provide sufficient power to effect the return of said needle, for the slight frictional contact between disk and record would be quite insufficient for this purpose. It is particularly desirable that this should be so as the needle would otherwise be placed under undue stress during the period of reproducing and an attachment of the repeater to the tone arm or other portion of the talking machine become necessary. By properly proportioning the radii of gyration of these masses and the masses themselves, a suitable angular momentum is obtainable and is designed to effect proper action at the lowest speeds usually employed with the record. A couple is thus set up which exerts a torque about the axis of the turn table and which will continue the rotation of the disk 11 sufficiently to return the needle to the said slot under the guidance of the said barrier or barriers. The repeating device, therefore, is quite independent of the size or character of the needle and the normal variation in the speed of the turn table.

I claim:—

1. A repeating device for talking machines, comprising a disk member adapted to rest upon the record of the talking ma-

chine and rotatable therewith, said disk member being provided with an inwardly directed slot to receive the reproducing needle, said disk being adapted to be restrained from rotation by the engagement of said needle in said slot, and the slot communicating with a cut-out portion of the disk, and means acting with said disk member to afford sufficient angular momentum thereof to return the needle to the said slot after its release therefrom.

2. A repeating device for talking machines, comprising a disk member adapted to rest upon the record of the talking machine and rotatable therewith, said disk member being provided with an inwardly directed slot to receive the reproducing needle, said disk being adapted to be restrained from rotation by the engagement of said needle in said slot, and the slot communicating with a cut-out portion of the disk, and weighted arms extending from said disk member.

3. A repeating device for talking machines, comprising a disk member adapted to rest upon the record of the talking machine and rotatable therewith, said disk member being provided with an inwardly directed slot to receive the reproducing needle, said disk being adapted to be restrained from rotation by the engagement of said needle in said slot, and the slot communicating with a cut-out portion of the disk, and diametrically opposed weighted arms extending from said disk member.

4. A repeating device for talking machines, comprising a circular disk member provided with a central opening to fit upon the record spindle of the talking machine, said disk member being adapted to rotate with the record and provided with an inwardly directed slot to receive the reproducing needle, said disk being adapted to be restrained from rotation by the engagement of said needle in said slot, and the slot communicating with a cut-out portion of the disk, and means acting with said disk member to afford sufficient angular momentum thereof to return the needle to the said slot after its release therefrom.

5. A repeating device for talking machines, comprising a circular disk member provided with an annular outer barrier portion and a central partly circular barrier portion, the latter being provided with a central opening to fit upon the record spindle of the talking machine, said disk being adapted to rotate with the record and provided with an inwardly directed slot to receive the reproducing needle, said disk being adapted to be restrained from rotation by the engagement of said needle in said slot, and the slot communicating with a cut-out portion of the disk, which portion ex-

tends substantially to the end of the inner circular barrier portion which latter then continues at a suitable curvature to the outer end of the said slot, and two diametrically  
5 opposed weighted arms extending outwardly from the circumference of the disk member.

Signed at New York, in the county of New York, and State of New York, this 11th day of February, A. D. 1915.

FRANK S. LEISENRING.

Witnesses:

FRED'K F. SCHUETT,  
LAURA E. SMITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





*File Copy*

SOUND BOX,  
# 1,143,394-----J. Hoffay,  
Patented-June 15, 1915.  
Filed-March 13, 1914.

J. HOFFAY.

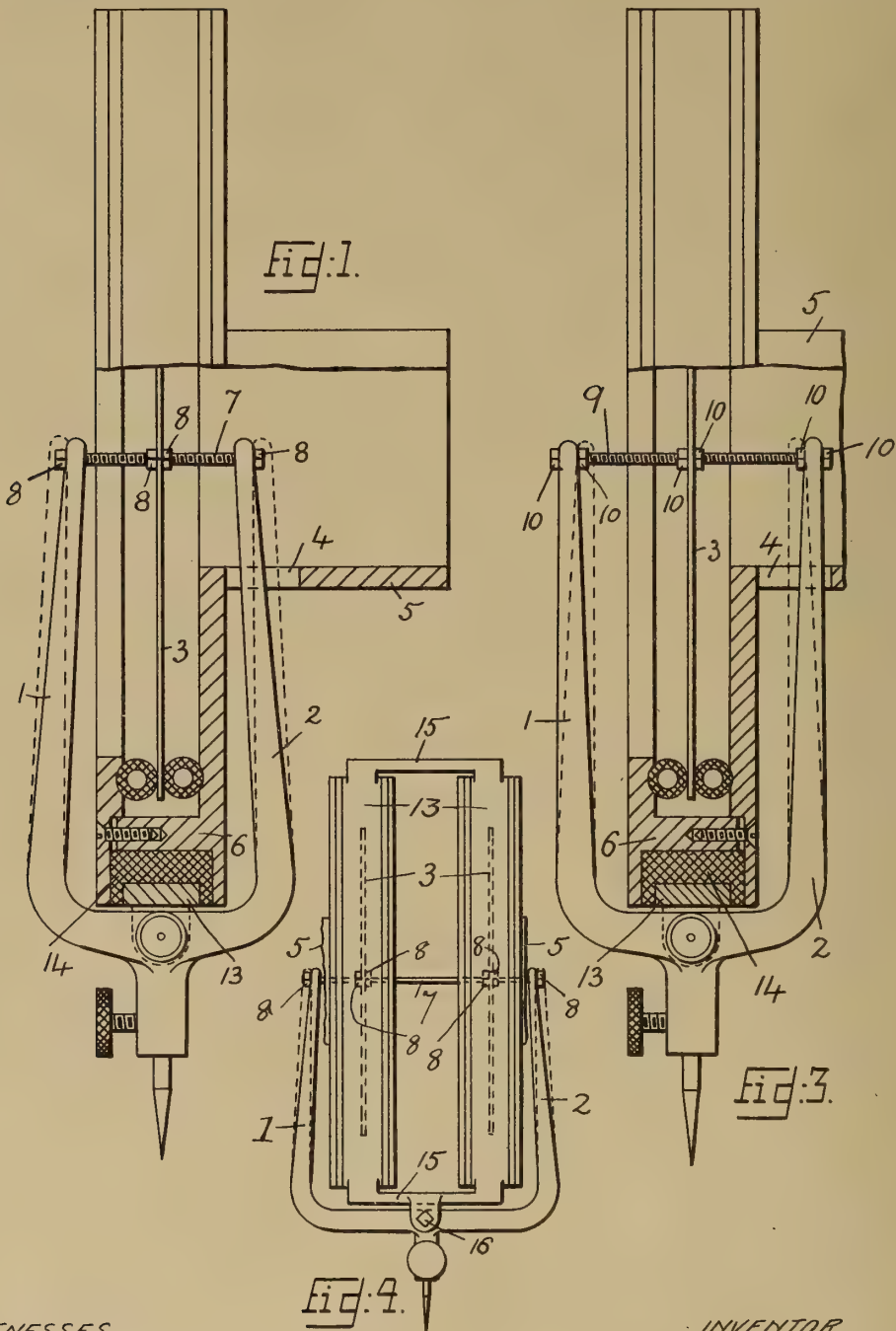
SOUND BOX.

APPLICATION FILED MAR. 13, 1914.

1,143,394.

Patented June 15, 1915.

2 SHEETS—SHEET 1.



WITNESSES

*F. E. Barry*  
*L. H. Schmidt*

INVENTOR

*JOSE HOFFAY,*  
BY *Munn & Co.*  
ATTORNEYS.



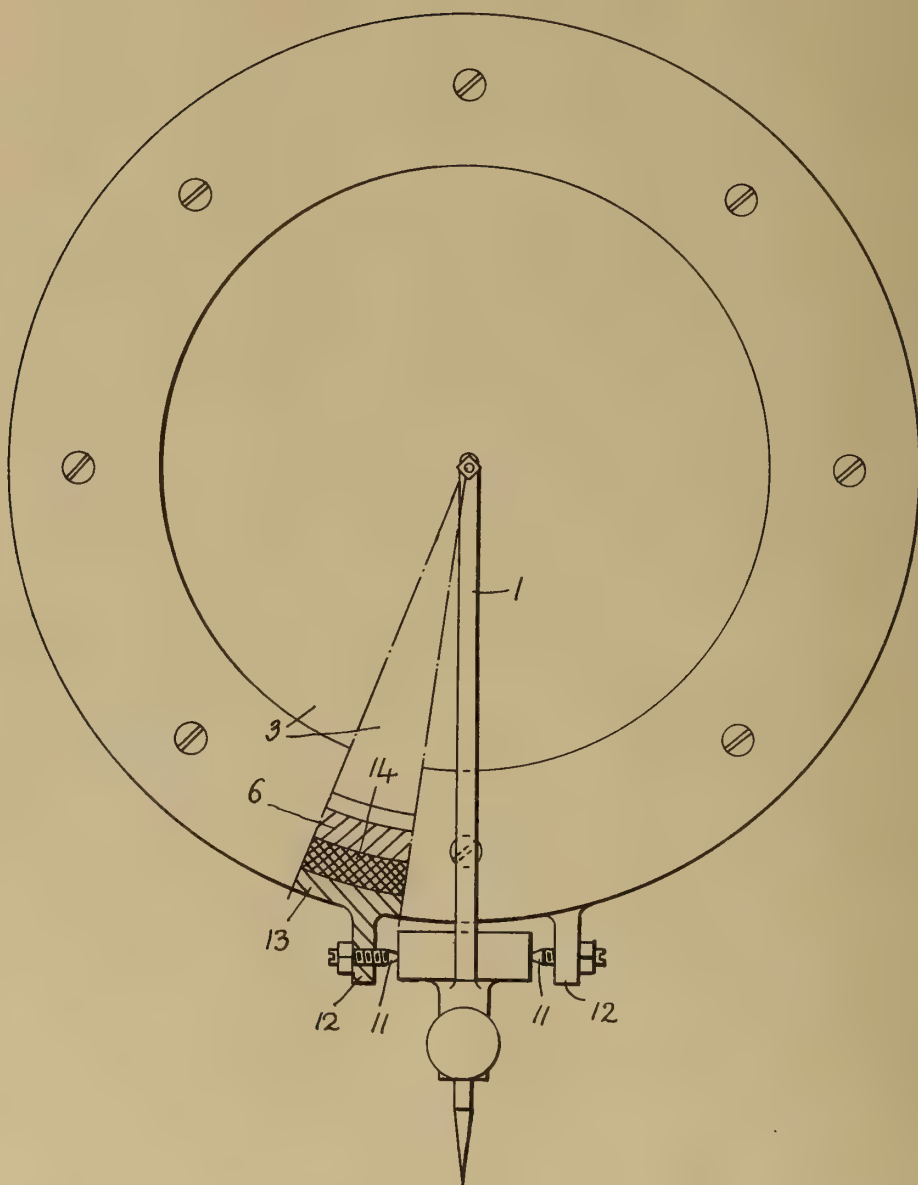


1,143,394.

J. HOFFAY.  
SOUND BOX.  
APPLICATION FILED MAR. 13, 1914.

Patented June 15, 1915.  
2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES  
*J. E. Barry*  
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BY *Munn & Co.*  
ATTORNEYS.

# UNITED STATES PATENT OFFICE.

JOSE HOFFAY, OF LONDON, ENGLAND.

SOUND-BOX.

1,143,394.

Specification of Letters Patent. Patented June 15, 1915.

Application filed March 13, 1914. Serial No. 824,443.

*To all whom it may concern:*

Be it known that I, JOSE HOFFAY, a citizen of the Republic of Mexico, and a resident of London, England, have invented certain new and useful Improvements in Sound-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to improvements in sound boxes or the like for gramophones, phonographs and the like machines having the stylus lever made of a forked formation, the bifurcations straddling the diaphragm, which formation is not *per se* new.

The invention has for an object to obtain a vibratory action of the diaphragm which is free from the defects arising from the action of distortion of the stylus lever arising from the working of the stylus in the sound groove.

To this end, the invention consists in combining a forked stylus lever with a diaphragm in such manner that the bifurcations connected to the diaphragm are under stress and tend either to separate from or approach toward each other so as respectively to put under continuous tension or compression relatively rigid means passing through the diaphragm and connecting the bifurcations to the diaphragm and to one another, thereby balancing by relatively rigid connection the diaphragm between the resilient bifurcations in the stylus lever, and obtaining a braced or more rigid structure. Embodiments of the invention are illustrated, by way of example, in the accompanying drawings, in which:—

Figure 1 shows an elevation of one form of stylus lever in a sound box shown partly in transverse section; Fig. 2 is a face view partly in section; Fig. 3 shows an elevation of a modified form of stylus lever in a sound box shown in transverse section; Fig. 4 is an elevation of another modification.

The stylus lever comprises two bifurcations, 1, 2, which straddle the diaphragm, 3, one on the outer side, and the other on the inner side and passing through an opening, 4, in the usual tubular extension, 5, of the sound box, 6, without contact therewith. The bifurcations on opposite sides are connected to the diaphragm and to one another under stress by means passing through the diaphragm.

The bifurcations may be kept under stress by means such as a bolt and nuts, 7, 8, (Fig.

1), pulling or tying them toward one another to the relative positions shown in full lines, from what would be their natural unrestrained relative positions shown in dotted lines. Or, the bifurcations may be kept under stress by means such as a bolt and nuts, 9, 10, (Fig. 3) splaying or strutting them apart from what would be their natural relative positions shown in dotted lines.

The bifurcations may be insulated from the diaphragm, by making the connector of a suitable insulating substance, or in other suitable manner.

The stylus lever may be pivotally mounted on the casing of the sound box in any convenient manner, for instance, by pivots, 11, in brackets, 12, integral with a carrier ring, 13, insulated from the casing of the sound box by a rubber or the like ring, 14, but this manner of mounting does not form part of the invention and other ways may be employed.

In the modification represented in Fig. 4, a forked stylus lever is represented for operating two diaphragms. The diaphragms are mounted in sound boxes which are duplicates of that represented in Fig. 3, and may be connected to a trumpet or trumpets in any convenient manner. The sound boxes are arranged facing one another and may be spaced apart, by a yoke or yokes, 15, made fast to two carrier rings, 13. The forked stylus lever is pivoted on the yoke at 16, and the bifurcations, which are under stress, extend, on the inner sides of the diaphragms, through the tubular extensions, 5, and are connected to the diaphragms and to one another by a connector, 17, passing through both diaphragms.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means kept under continuous stress by the bifurcations and connecting the bifurcations to the diaphragm and to each other.

2. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations un-



der stress and tending to separate from each other, and relatively rigid means kept under continuous tension by the bifurcations and connecting the bifurcations to the diaphragm and to each other.

3. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means kept under continuous stress by the bifurcations and connecting the free ends of the bifurcations to the diaphragm and to each other without contacting said ends with the diaphragm.

4. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means kept under continuous stress by the bifurcations and passing through the diaphragm and connecting the bifurcations to the diaphragm and to each other.

5. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means comprising a bolt and nuts on the bolt bearing against the diaphragm and the bifurcations, said means being kept under continuous stress by the bifurcations and connecting the bifurcations to the diaphragm and to each other.

6. Sound reproducing or recording means comprising, in combination, a plurality of sound boxes, a plurality of diaphragms mounted therein, a pivotally mounted forked stylus lever straddling the diaphragms and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means kept under continuous stress by the bifurcations and connecting the bifurcations to the diaphragms and to each other.

7. Sound reproducing or recording means

comprising, in combination, a plurality of sound boxes, a plurality of diaphragms mounted therein, means spacing apart the sound boxes, a pivotally mounted forked stylus lever on said spacing means and straddling the diaphragms and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means kept under continuous stress by the bifurcations and connecting the bifurcations to the diaphragms and to each other.

8. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means kept under continuous stress by the bifurcations and connecting the bifurcations to the diaphragm and to each other, one of said bifurcations passing through part of the sound box.

9. Sound reproducing or recording means comprising, in combination, a plurality of sound boxes spaced apart, a plurality of diaphragms mounted therein, a pivotally mounted forked stylus lever straddling the diaphragms and having its bifurcations under stress and tending to change their distance from each other, and relatively rigid means kept under continuous stress and connecting the free ends of the bifurcations to the diaphragms and to each other without contacting said ends with the diaphragms.

10. Sound reproducing or recording means comprising, in combination, a plurality of sound boxes spaced apart, a plurality of diaphragms mounted therein, a pivotally mounted forked stylus lever straddling the diaphragms and having its bifurcations under stress and tending to separate from each other, and relatively rigid means kept under continuous stress and connecting the bifurcations to the diaphragms and to each other.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

JOSE HOFFAY.

Witnesses:

ALFRED DAY,  
WALTER DAY.

PHONOGRAPH,  
# 1,143,784-----C. H. Roop,  
Patented-June 22, 1915.  
Filed-June 29, 1914.

C. H. ROOP.  
PHONOGRAPH.  
APPLICATION FILED JUNE 29, 1914.

1,143,784.

Patented June 22, 1915

FIG. 1.

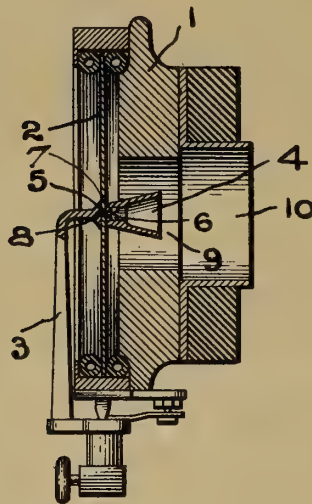


FIG. 2.



Witnesses

*L. S. Meyer*  
*C. R. Ziegler*

Inventor  
*Clarence H. Roop,*

By *Joshua R. H. Polke.*  
Attorney



# UNITED STATES PATENT OFFICE.

CLARENCE H. ROOP, OF CAMDEN, NEW JERSEY, ASSIGNOR OF ONE-THIRD TO EDWARD WALT. HAVENS, OF BELFORD, NEW JERSEY, AND ONE-THIRD TO HOWARD G. HAVENS, OF CAMDEN, NEW JERSEY.

## PHONOGRAPH.

1,143,784.

Specification of Letters Patent.

Patented June 22, 1915.

Application filed June 29, 1914. Serial No. 847,839.

*To all whom it may concern:*

Be it known that I, CLARENCE H. ROOP, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to improvements in phonographs, and more particularly to an improved attachment for the phonograph diaphragm, said attachment constituting a sound rectifier operating to eliminate the metallic and scraping sounds so common with sound reproducers in general use.

A further object is to provide an attachment of the character stated which can be connected to any ordinary diaphragm, utilizing for the purpose the screw which is commonly employed to connect the stylus bar to the diaphragm.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a view in longitudinal section illustrating my improved attachment in operative position, and Fig. 2 is a perspective view of the attachment removed.

1 represents a sound box of the ordinary type having a diaphragm 2 therein of mica or other suitable material such as commonly employed and to which the ordinary stylus bar 3 is secured.

4 represents my improved attachment which in the form illustrated, is of general conical shape, and is secured by a screw 5 to the center of the diaphragm 2 opposite the point of attachment of the stylus bar 3.

The screw 5 is the screw which is ordinarily employed for securing the stylus bar to the diaphragm, and when used for connecting my improved attachment, is positioned inside of the attachment with the head 6 of the screw bearing against an internal shoulder 7, and the threaded portion of the screw projecting through the end of the attachment, through a central opening in the diaphragm, and screwed into the socket 8 which is tapped in the end of the

stylus bar. Hence to connect my improved attachment to any ordinary diaphragm, it is simply necessary to remove the screw and utilize the same as a securing device as above described.

The attachment in its preferred form is of aluminum and conical in shape, but I would have it understood that I do not limit myself to the particular material employed, nor to the precise shape, as a wide range of modification is possible with varying results. In any event, it is my purpose to secure the attachment to the diaphragm at its center and on the side thereof adjacent the sound tube or horn. This is shown clearly in Fig. 1, in which it will be seen that the attachment 4 is located centrally within the opening 9 and concentric with the sleeve 10 which is connected to the sound arm or horn, hence the sound waves pass around the attachment at all sides thereof.

As above stated, the attachment is designed to prevent the transmission of metallic and scraping sounds which are so common in phonographs, and hence I term the device a "rectifier" because it rectifies the sound and causes the same to be reproduced in its natural state, and I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a diaphragm, and a stylus bar, of a hollow conical rectifier having its smaller end secured to the center of the diaphragm by a screw extending through the rectifier and the diaphragm and screwed into the stylus bar, rigidly securing the parts together, substantially as described.

2. The combination with a sound box, a diaphragm in the sound box, said sound box having an outlet sound passage in one side, and a stylus bar positioned at one side of the diaphragm, of a hollow conical rectifier having its smaller end secured to the center of the diaphragm, and its larger end

projecting centrally into the sound passage,  
said rectifier being secured by a screw pro-  
jected through the rectifier and the dia-  
phragm and screwed into the stylus bar,  
5 clamping the parts together, substantially  
as described.

In testimony whereof I have signed my

name to this specification in the presence  
of two subscribing witnesses.

CLARENCE H. ROOP.

Witnesses:

E. WALT. HAVENS,  
M. E. DITTUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

PHONOGRAPH PATENT.

SOUND BOX OR THE LIKE,  
# 1,144,202-----J. Hoffay,  
Patented-June 22, 1915.  
Filed-March 19, 1914.



J. HOFFAY.  
SOUND BOX OR THE LIKE.  
APPLICATION FILED MAR. 13, 1914.

1,144,202.

Patented June 22, 1915.

2 SHEETS—SHEET 1.

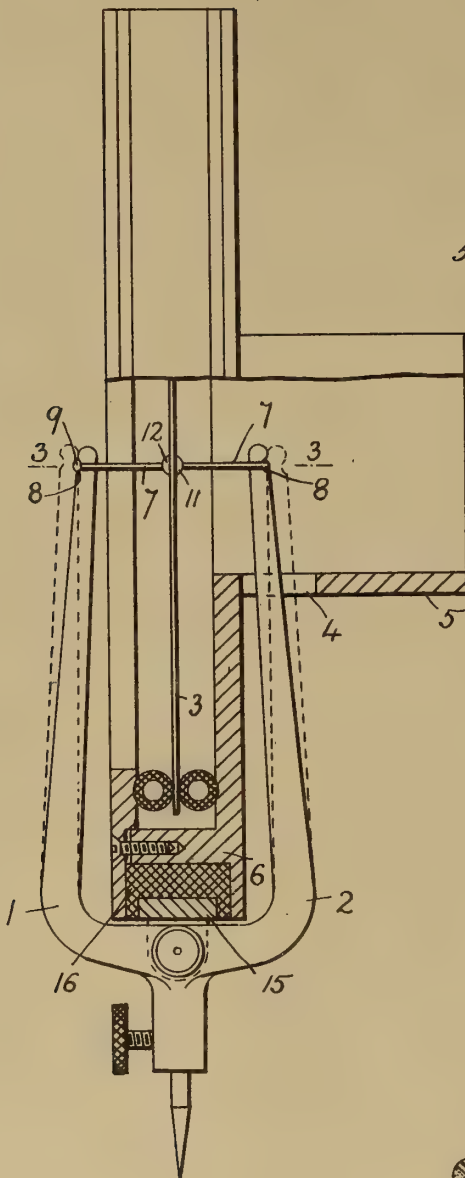


Fig. 1.

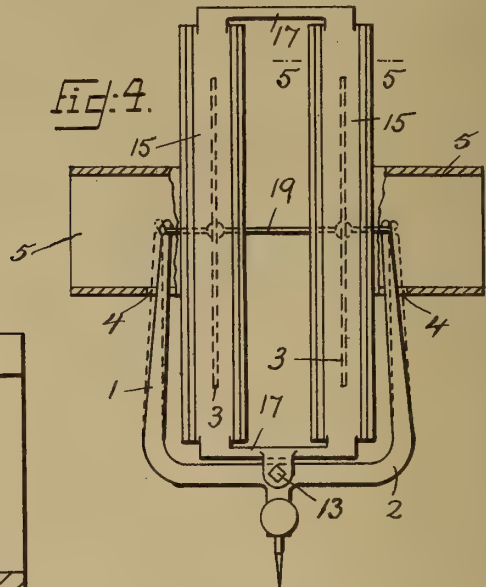


Fig. 4.

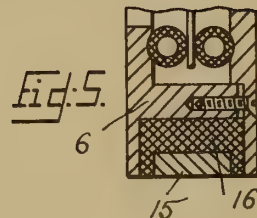


Fig. 5.

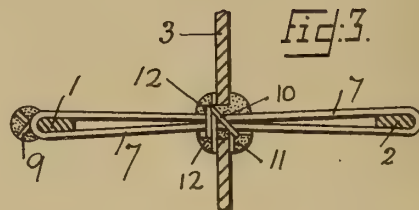
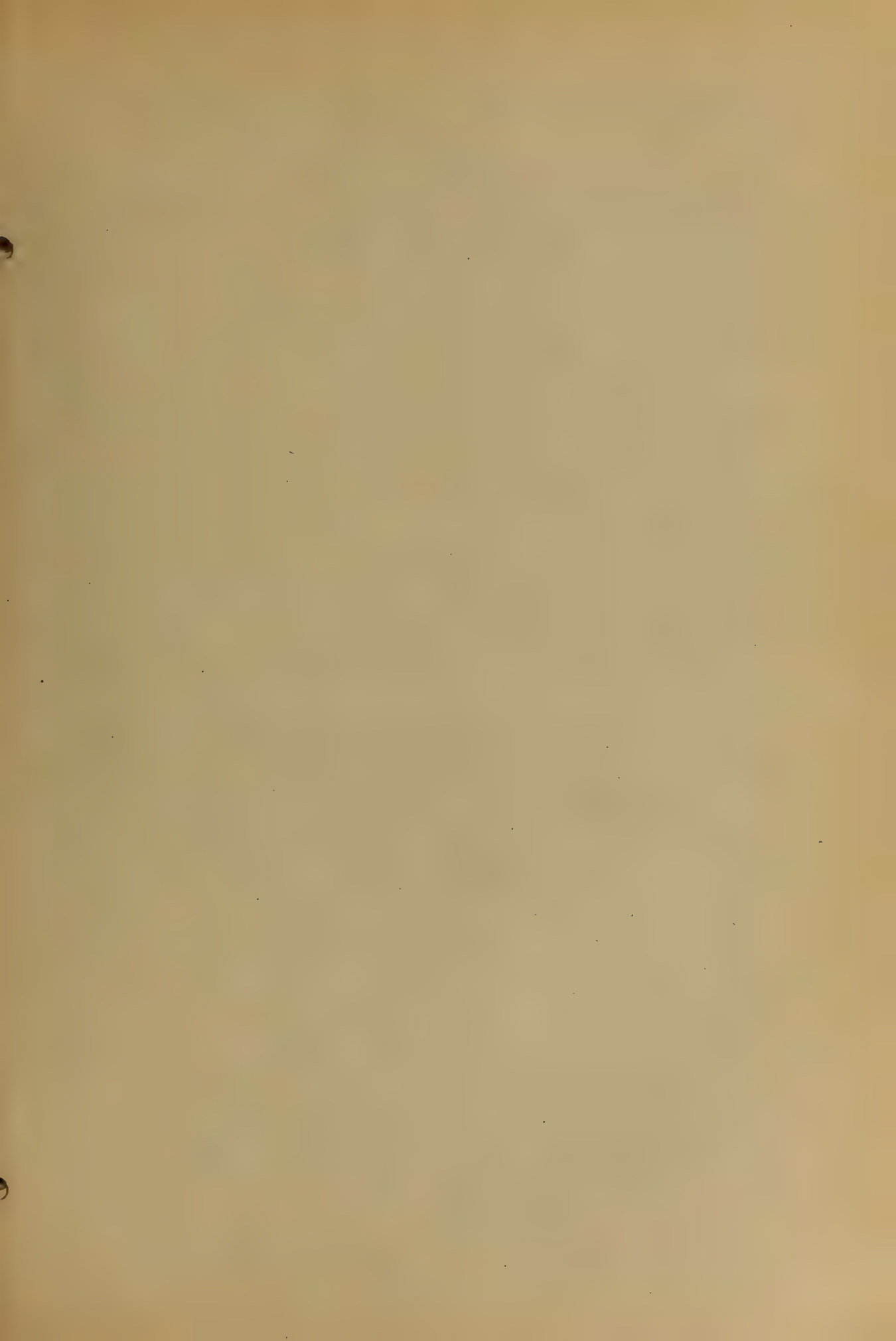


Fig. 3.

WITNESSES

*F. B. Barry*  
*L. H. Schmidt*

INVENTOR  
JOSE HOFFAY,  
BY *Mumford & Co.*  
ATTORNEYS

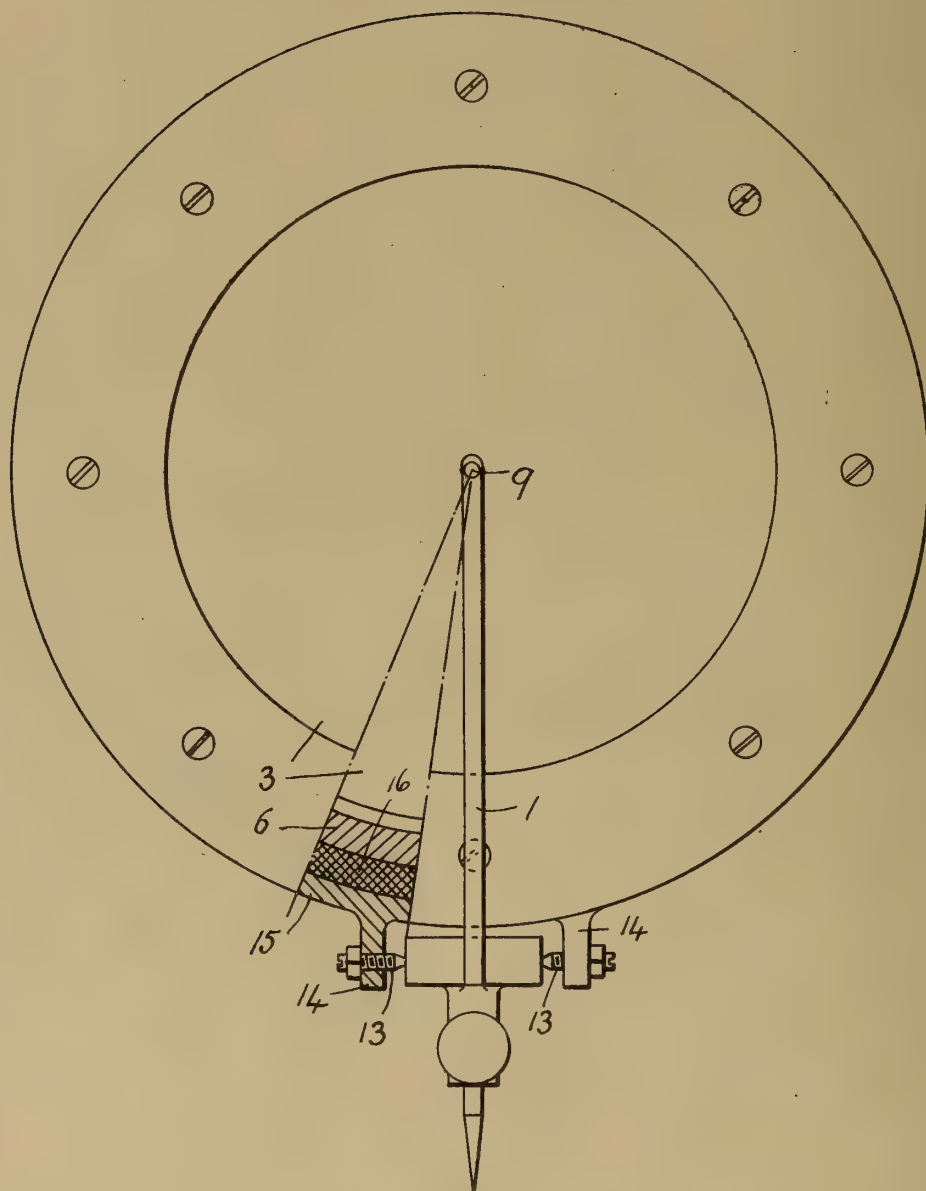


1,144,202.

J. HOFFAY.  
SOUND BOX OR THE LIKE.  
APPLICATION FILED MAR. 13, 1914.

Patented June 22, 1915.  
2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

*H. B. Barry*  
*L. H. Schmidt*

INVENTOR

*JOSE HOFFAY,*  
BY *Mum & Co.*  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

JOSE HOFFAY, OF LONDON, ENGLAND.

## SOUND-BOX OR THE LIKE.

1,144,202.

Specification of Letters Patent. Patented June 22, 1915.

Application filed March 13, 1914. Serial No. 824,442.

*To all whom it may concern:*

Be it known that I, JOSE HOFFAY, a citizen of the Republic of Mexico, and a resident of London, England, have invented certain new and useful Improvements in Sound-Boxes or the like; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to improvements in sound boxes or the like for gramophones, phonographs and the like machines having the stylus lever made of a forked formation, the bifurcations straddling the diaphragm, which form of lever is not *per se* new.

The objects of the invention are to obtain a vibratory action of the diaphragm free from the defects arising from the distortion of the stylus lever arising from the working of the stylus in the sound groove, and to obtain a vibratory action of the diaphragm free from the defects produced by the displacement of the stylus lever parallel to the diaphragm owing to irregularities of the record.

To these ends, the invention consists in combining a forked stylus lever with a diaphragm so that the bifurcations connected to the diaphragm are under stress and tend to separate from each other, so as to keep under continuous tension flexible inelastic means, preferably passing through the diaphragm, connecting the bifurcations to the diaphragm and to each other, thereby balancing the diaphragm between the resilient bifurcations of the stylus lever and obtaining a braced or more rigid structure, which while permitting displacement of the stylus lever parallel to the diaphragm, causes vibratory action on the diaphragm of either bifurcation due to this displacement to be balanced or neutralized by the other bifurcation.

Embodiments of the invention are illustrated, by way of example, in the accompanying drawings, in which:—

Figure 1 shows an elevation of one form of stylus lever in a sound box shown partly in transverse section; Fig. 2 is a face view, partly in section; Fig. 3 is an enlarged diagrammatic sectional plan of a detail, on 3—3, Fig. 1; Fig. 4 is an elevation of a modification; Fig. 5 is a section of a detail of construction on 5—5, Fig. 4.

The stylus lever comprises two bifurcations, 1, 2, which straddle the diaphragm, 3, one on the outer side, and the other on the

inner side and passing through an opening, 4, in the usual tubular extension, 5, of the sound box, 6, without contact therewith. The bifurcations on opposite sides are connected to the diaphragm and to each other under stress by flexible inelastic means such as a silk, hemp, jute, or other cord or the like, 7, preferably passing through the diaphragm. The cord may conveniently be formed as an endless plain or twisted loop engaging notches, 8, in the bifurcations as shown in Fig. 3, and knotted and waxed, at 9. The cord may be secured to the diaphragm by another loop of cord, 10, knotted and waxed, at 11, on one side of the diaphragm, embracing the loop, 7, at its mid-length, and knotted and waxed at 12, on the other side of the diaphragm.

The employment of a flexible connector in combination with a forked stylus lever having its bifurcations under stress is of advantage in that when displacement of the stylus lever parallel to the diaphragm causes one bifurcation to tend to vibrate the diaphragm, this is compensated or negated by the contrary action of the other bifurcation, so that foreign sounds produced by irregularities of the sound groove are to a very appreciable extent eliminated.

The stylus lever may be pivotally mounted on the sound box in any convenient manner, for instance by pivots, 13, in brackets, 14, integral with a carrier ring, 15, insulated from the casing of the sound box by a rubber or the like ring, 16, but this manner of mounting does not form part of the invention and other ways may be employed.

In the modification represented in Fig. 4, a forked stylus lever is represented for operating two diaphragms. The diaphragms are mounted in two sound boxes which may be connected to a trumpet or trumpets in any convenient manner. These are arranged facing one another and are spaced apart by a yoke or yokes, 17, made fast to two carrier rings, 15. The forked stylus lever is pivoted on the yoke, at 13, and the bifurcations, which are under stress, extend through the tubular extensions, 5, and are connected to the diaphragms and to one another by a connector, 19, preferably passing through both diaphragms.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a sound box or the like for a gramophone, phonograph, or the like machine, in

combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to separate from each other, and flexible inelastic means kept under continuous tension by the bifurcations and connecting the bifurcations to the diaphragm and to each other.

2. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to separate from each other, and flexible inelastic means kept under continuous tension by the bifurcations and connecting the free ends of the bifurcations to the diaphragm and to each other without contacting said ends with the diaphragm.

3. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to separate from each other, flexible inelastic means kept under continuous tension by the bifurcations and passing through the diaphragm and connecting the bifurcations to each other, and means securing the flexible means to the diaphragm.

4. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination, a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to separate from each other, an endless loop of flexible and inelastic material kept under continuous tension by the bifurcations and passing through the diaphragm and connecting the bifurcations to each other, and a second loop knotted on one side of the diaphragm, embracing the first loop, and knotted on the other side of the diaphragm.

5. Sound reproducing or recording means comprising, in combination, a plurality of sound chambers, a plurality of diaphragms mounted therein, a pivotally mounted forked stylus lever straddling the diaphragms and

having its bifurcations under stress and tending to separate from each other, and flexible inelastic means kept under continuous tension by the bifurcations and connecting the bifurcations to the diaphragms and to each other.

6. In a sound box or the like for a gramophone, phonograph, or the like machine, in combination with a tubular extension of the sound box, of a diaphragm, a pivotally mounted forked stylus lever straddling the diaphragm and having its bifurcations under stress and tending to separate from each other, and flexible inelastic means kept under continuous tension by the bifurcations and connecting the bifurcations to the diaphragm and to each other, one of said bifurcations entering into the tubular extension of the sound box.

7. Sound reproducing or recording means comprising, in combination, a plurality of sound chambers, a plurality of diaphragms mounted therein, a pivotally mounted forked stylus lever straddling the diaphragms and having its bifurcations under stress and tending to separate from each other, flexible inelastic means kept under continuous tension by the bifurcations and passing through the diaphragms and connecting the bifurcations to each other, and means securing the flexible means to the diaphragms.

8. Sound reproducing or recording means comprising, in combination, a plurality of sound chambers, a plurality of diaphragms mounted therein, a pivotally mounted forked stylus lever straddling the diaphragms and having its bifurcations under stress and tending to separate from each other, and flexible inelastic means kept under continuous tension by the bifurcations and connecting the free ends of the bifurcations to the diaphragms and to each other without contacting said ends with the diaphragms.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

JOSE HOFFAY.

Witnesses:

ALFRED DAY,  
WALTER DAY.

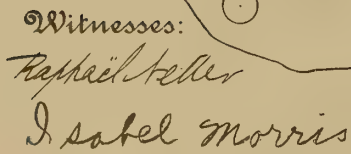


REPEATING PHONOGRAPH,  
# 1,144,219-----A. F. Madden,  
Patented-June 22, 1915.  
Filed-December 9, 1914.



1,144,219.

2 SHEETS—SHEET 1.



Inventor  
Albert F. Madden

By his Attorneys *Knight Bros*



1,144,219.

Patented June 22, 1915.  
 2 SHEETS—SHEET 2.

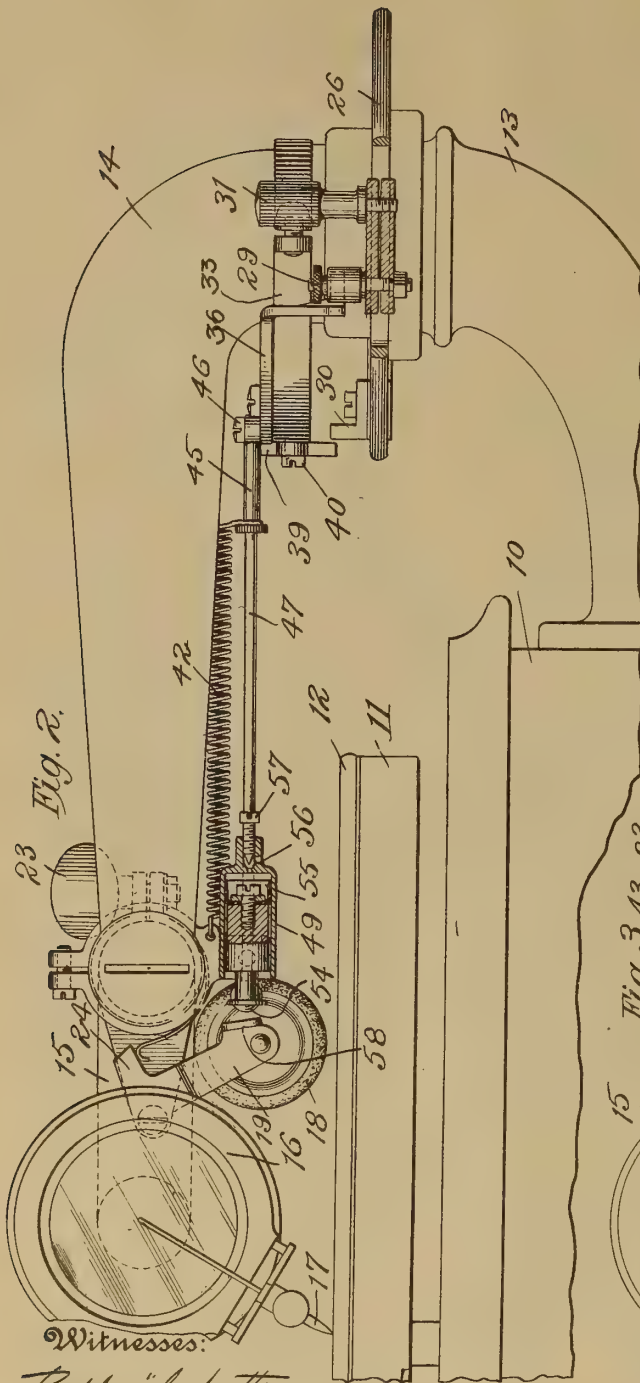


Fig. 2.

Witnesses:  
 Raphaël Better  
 Isabel Morre

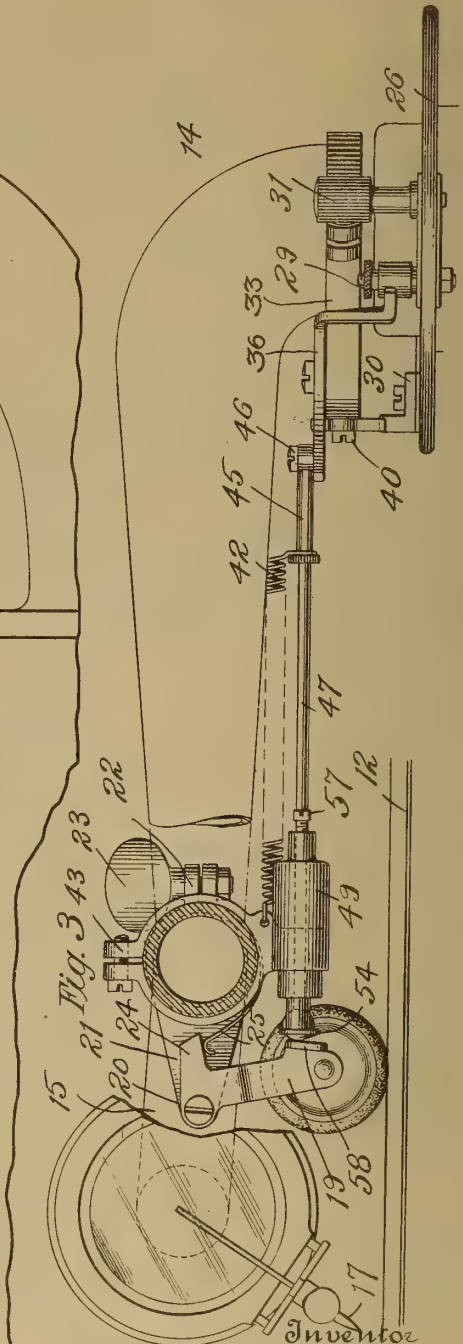


Fig. 3

Inventor  
 Albert F. Madden

By his Attorneys  
 Knight Bros



# UNITED STATES PATENT OFFICE.

ALBERT F. MADDEN, OF NEWARK, NEW JERSEY.

## REPEATING PHONOGRAPH.

1,144,219.

Specification of Letters Patent. Patented June 22, 1915.

Application filed December 9, 1914. Serial No. 876,239.

*To all whom it may concern:*

Be it known that I, ALBERT F. MADDEN, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Repeating Phonographs, of which the following is a full and clear specification.

My invention relates in general to the repeating mechanism of phonographs and more especially to mechanical repeating mechanism which is automatic in its operation.

Phonographs are employed for rendering dance music and for such purposes it is desirable to repeat the music indefinitely. While, of course, my invention is applicable to repeating phonographs for whatever purpose they may be employed, I refer to their use for rendering dance music as this field is one in which the automatic repeating of the selection is perhaps most desired.

The object of the invention is to provide a simple and inconspicuous attachment for phonographs by which the reproducer, when the needle arrives at the end of the record, is automatically returned to the starting position and then released so that the continued operation of the phonograph proper will result in the selection being repeated.

According to my invention, the mechanism can be adjusted to cause the actuation of the repeat mechanism with great accuracy to suit the exact length of each selection to be reproduced. The construction also provides for the removal of the reproducer needle from the record groove prior to the return of the reproducer to starting position, and the gradual introduction of the needle into the record groove at the completion of the return movement, so that injury to the record is avoided.

A prominent feature of the invention is the use of the surface of the record itself for operating the return member. This is effected by the provision of a yielding resilient roller which is automatically thrown into engagement with the surface of the record at the end of the selection, and is held with its axis of rotation inclined to the record groove so that by the rotation of

the record, the roller is caused to veer rapidly out of the path of the successive grooves until the reproducer arrives at starting position where the return member is withdrawn from contact with the record, and the reproducing needle is again gradually introduced into the groove.

The invention is applicable to sound reproducing machines of either disk or cylinder type herein referred to as phonographs, but to clearly illustrate the principles thereof I shall describe the same with reference to an embodiment thereof in a disk machine, provided with the usual articulated reproducer arm.

In the drawings, Figure 1 is a plan view of the repeating mechanism; Fig. 2 is a side elevation thereof with parts in section, the device being shown in normal position; Fig. 3 is a similar view with the parts shown in the automatic return position. Fig. 4 is a detail front elevation of the automatic return roller; Fig. 5 is a similar view of the dash pot with its setting member and Fig. 6 is a detail elevation showing the tripping mechanism for controlling the inauguration of the return movement.

Referring more specifically to said drawing, 10 indicates the ordinary box or housing of the phonograph, 11 the turn table and 12 a disk record. The usual sound chest or bracket 13 supports the reproducer arm 14 which has as its outer end the U-tube 15, carrying the box 16 and needle 17. These parts are herein referred to as the reproducer. The automatic return roller 18 is journaled in a forked knee lever 19, which is fulcrumed at 20 upon a bracket 21 made fast to U-tube 15 by means of the split ring clamp 22. The position of bracket 21 on U-tube 15 is readily adjusted by means of the wing bolt 23, which controls the clamp. Knee lever 19 has an arm 24 engaged by a leaf spring 25, suitably mounted on the split ring clamp 22, by which the roller 18 is normally held out of engagement with the record. It will be observed from reference to Fig. 1 that the roller 18 is so inclined to the record groove that clockwise movement of the record 12 will cause the same to veer toward the outer edge of the disk. During

nections for moving said return means into engagement with the record groove, a lever moving with the reproducer and pivotally connected with said spring, a cam finger  
5 projecting from said lever, a stationary stop engaged by said cam finger during the return of the reproducer, for storing power in said spring, means for locking said lever

with the spring under tension, and a stationary stop for withdrawing said locking 10 means from said lever.

ALBERT F. MADDEN.

Witnesses:

WM. A. COURTLAND,  
OCTAVIUS KNIGHT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

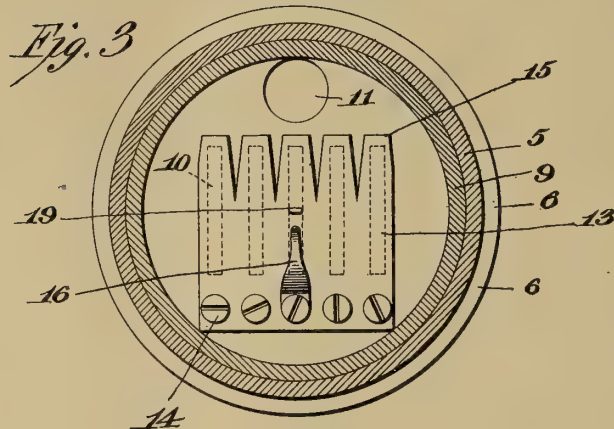
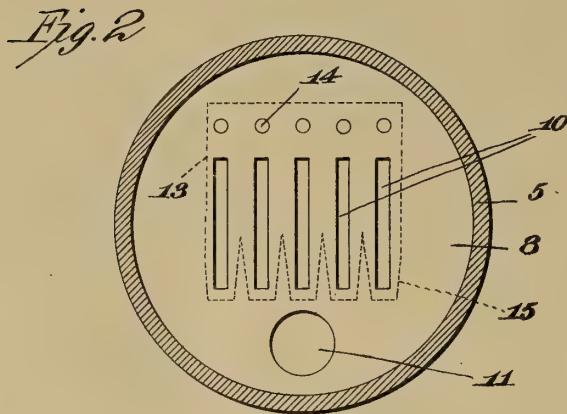
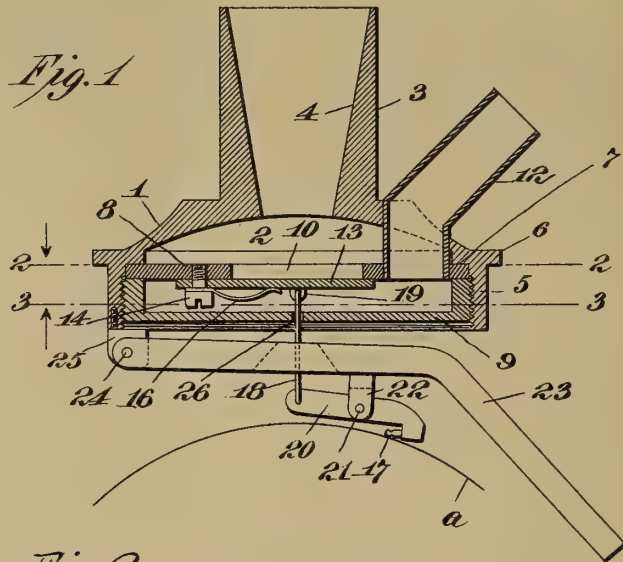
SOUND REPRODUCER,  
# 1,145,080-----A. N. Pierman,  
Patented-July 6, 1915.  
Filed-November 24, 1905.



A. N. PIERMAN.  
SOUND REPRODUCER.  
APPLICATION FILED NOV. 24, 1905.

1,145,080.

Patented July 6, 1915.



Witnesses:

Jas. F. Coleman  
Delos Holden

Inventor

Alexander N. Pierman

by Frank L. Egan

Attorney

# UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SOUND-REPRODUCER.

1,145,080.

Specification of Letters Patent.

Patented July 6, 1915.

Application filed November 24, 1905. Serial No. 283,837.

*To all whom it may concern:*

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Reproducers, of which the following is a description.

My invention relates to devices for the reproduction of vibrations which are representative of sound waves and more particularly to phonograph reproducers, and has for its object the production of a reproducer whose tones will be characterized by more perfect quality than those of reproducers ordinarily used, and which will be capable of producing tones of greater volume than such reproducers; which is simple and compact, cheap to manufacture, and which can be applied to phonographs of the usual construction now in common use.

My invention operates upon a new principle, the sounds being produced by vibrations resulting from varying the extent of opening of ports situated in a sound chamber, and adapted to permit the passage of a body of air or other elastic fluid, the valve consisting of an elastic plate operating by flexure.

My invention consists in the features hereinafter described and claimed.

Referring to the accompanying drawings, Figure 1 is a vertical section of a phonograph reproducer constructed in accordance with my invention. Fig. 2 is a section on line 2—2 of Fig. 1. Fig. 3 is a section on line 3—3 of Fig. 1.

Corresponding parts are indicated by the same reference numerals in the several views.

The improved reproducer comprises a hollow body 1 which forms the sound the resonance chamber 2. This chamber is formed with an arched roof the elements of whose surface are curved lines (see Fig. 1). By forming the chamber in this manner the quality of the sounds produced is improved and the amplitude increased. A neck 3 having a tapered bore 4 extends outward from the chamber 2 and is adapted to be connected with an amplifying horn or megaphone in any suitable manner. The body 1 is also provided with a cylindrical wall 5 and an annular flange 6, these parts being adapted to fit within the reproducer carrier arm of

a phonograph. Within the body 1 is an annular shoulder 7 which forms a seat for a plate 8 which may be of brass one-sixteenth of an inch in thickness or other suitable material and which is held firmly in position by a cup-shaped clamping member 9, the exterior of which is screw-threaded within the wall 5 of the body 1. The plate 8 is provided with a set of ports 10 shown as rectangular slots which may be one-half inch in length by three sixty-fourths of an inch in width. The plate 8 is apertured at 11 to receive the tube 12 which will be connected by a flexible connection such as a rubber tube with any suitable apparatus for producing suction, for example, an air pump, the flexible connection permitting the body 1 to be carried along in the usual manner by the phonograph carrier arm.

The extent of opening of the ports 10 is varied by a valve plate 13. This plate may be composed of almost any material which is rigid, elastic and readily flexed, such as various metals and alloys; I have obtained very favorable results, however, from the use of a plate of celluloid of the shape shown in the drawings and measuring  $\frac{3}{4}$  of an inch square and  $\frac{1}{32}$  of an inch in thickness. I consider celluloid the preferable material for this purpose for the reason that it may readily be softened and pressed upon the valve seat and thereby made to fit more closely than could otherwise be possible. When allowed to harden after softening it resumes its original rigidity, elasticity and flexibility. This plate is seated upon and covers the ports 10, as shown, the plate being secured along one edge to the plate 8 by screws 14, and the opposite or free edge being serrated to form tongues 15. A spring 16 is held at one end by the middle screw 14 and presses at its free end upon the plate 13 at or near its center. This spring is designed to balance the air pressure which will be produced upon the plate 13 by the action of the suction device applied to the tube 12; the pressure of the spring increases as the plate is moved downward, which movement increases the flow of air, so that a substantially perfect balance is maintained in all positions of the plate 13. A high degree of suction is not required; the device can be operated to some extent by inhaling with the lungs. The plate 13 is adapted to be operated by



the reproducer stylus 17 so as to vary the extent of the opening of the ports 10. A link 18 is connected at one end to an eye 19 secured to the plate 13 and at its other end to the lever 20 which carries the stylus. The lever 20 is pivoted at 21 to a lug or lugs 22 carried by a floating weight 23 which is pivoted at 24 to a lug 25 carried by the flange 5. This weight moves freely up and down to permit the stylus 17 to follow irregularities in the contour of the record surface 2. The cup 9 is provided with a small aperture 26 to permit the link 18 to move freely up and down but the clearance is slight, so as not to affect the suction through the ports 10.

The operation of the device is as follows: The body 1 being held in the traveling carrier arm of the phonograph with the stylus 17 in operative position upon the phonograph or sound record 2, suction is applied to the tube 12 which produces a downward stress upon the plate 13 and slightly opens the ports 10. This stress is then balanced by the upward pressure of the spring 16 so that the ports 10 remain slightly open allowing the passage of a stream of air. As the reproducer stylus 17 is moved upward by an elevation of the sound record groove it draws the link 18 downwardly and causes the plate 13 to flex, thereby increasing the opening of the ports 10 and allowing a greater flow of air from the sound chamber 2 into the exhaust pipe 12. As the stylus 17 passes over the elevation and descends into a depression, the elasticity of the plate 13 and of the spring 16 decreases the extent of opening of the ports 10, thereby cutting down the flow of air. The varying of the extent of opening of the ports 10 is thus effected in exact accordance with the elevations and depressions of the sound record groove and the result is to produce sounds which are representative of said elevations and depressions, and which, as before stated, are of very perfect quality and may be of great volume.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. In a sound reproducer, the combination of a hollow body formed with chambers communicating through one or more ports, a celluloid plate seated on the ports, and means for flexing said plate to vary the extent of opening of said ports, substantially as set forth.

2. In a sound reproducer comprising a sound chamber having one or more ports, a valve seated upon said ports the seated portion or portions of said valve being composed of material which may be rendered plastic by heat, and means for operating said valve to vary the extent of opening of said ports, substantially as set forth.

3. In a sound reproducer, the combina-

tion with a sound chamber having ports, of means for producing a flow of elastic fluid through said ports, a valve seated upon said ports, the seated portions of said valve being composed of material which may be rendered plastic by heat, and means representative of sound vibrations for operating said valve to vary the extent of opening of said ports, substantially as set forth.

4. In a sound reproducer, the combination of a hollow body formed with a pair of chambers communicating through one or more ports, a valve for varying the extent of opening of said ports, a weight pivotally connected to said body, a stylus lever pivoted to said weight and connected to said valve in such a way that upward movement of the stylus causes movement of said valve away from the ports, substantially as set forth.

5. In a sound reproducer, the combination of a hollow body containing chambers communicating through one or more ports, a plate of elastic material seated upon the ports, said plate being fixedly mounted at one edge and free at the opposite edge, a stylus, and a lever connection between said stylus and plate, said connection coacting with said plate intermediate the said edges thereof, substantially as described.

6. In a sound reproducer, the combination of a hollow body containing chambers communicating through one or more ports, a plate of material which may be rendered plastic by heat seated upon the ports, said plate being fixedly mounted at one edge and free at the opposite edge, a stylus, and a lever connection between said stylus and plate, said connection coacting with said plate intermediate the said edges thereof, substantially as described.

7. In a sound reproducer, the combination of a hollow body containing chambers communicating through one or more ports, a plate of celluloid seated upon the ports, said plate being fixedly mounted at one edge and free at the opposite edge, a stylus, and a lever connection between said stylus and plate, said connection coacting with said plate intermediate the said edges thereof, substantially as described.

8. In a sound reproducer, the combination of a hollow body containing chambers communicating through one or more ports, a plate of elastic material seated upon the ports, said plate being fixedly mounted at one edge and free at the opposite edge, a spring pressing on said plate to press it into or toward a closed position, a stylus, and a lever connection between said stylus and plate, said connection coacting with said plate intermediate the said edges thereof, substantially as described.

9. In a sound reproducer, the combination of a hollow body containing chambers communicating through one or more ports, a



plate of elastic material seated upon the ports, said plate being fixedly mounted at one edge and free at the opposite edge, a weight pivotally connected to said body, a stylus lever pivoted to said weight and connected to said plate intermediate said edges thereof, substantially as described.

10. In a sound reproducer, the combination of a hollow body formed with a pair of chambers communicating through one or more ports, a valve for varying the extent of opening of said ports, a floating weight, a stylus lever pivoted to said weight and connected to said valve in such a way that upward movement of the stylus causes movement of said valve away from the ports, substantially as described.

11. In a sound reproducer, the combination of a hollow body formed with a pair of chambers communicating through one or more ports, a valve for varying the extent of opening of said ports, a floating weight, a stylus lever pivoted to said weight and con-

nected to said valve in such a way that upward movement of the stylus causes movement of said valve downwardly and away from the ports, substantially as described.

12. In a sound reproducer, the combination of a hollow body formed with a pair of chambers communicating through one or more ports, one of such chambers opening into the atmosphere, a valve situated in the other of said chambers for varying the extent of opening of said ports, a floating weight, a stylus lever pivoted to said weight and connected to said valve in such a way that upward movement of the stylus causes movement of said valve away from the ports, substantially as described.

This specification signed and witnessed this 22nd day of November 1905.

ALEXANDER N. PIERMAN.

Witnesses:

DELOS HOLDEN,  
MINO C. MACARTHUR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The second part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

The third part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The fourth part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

The fifth part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The sixth part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

The seventh part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The eighth part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

The ninth part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The tenth part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

The eleventh part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The twelfth part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

PHONOGRAPH,

# 1,145,146-----J. Johnson,  
Patented-July 6, 1915.  
Filed-April 25, 1914.

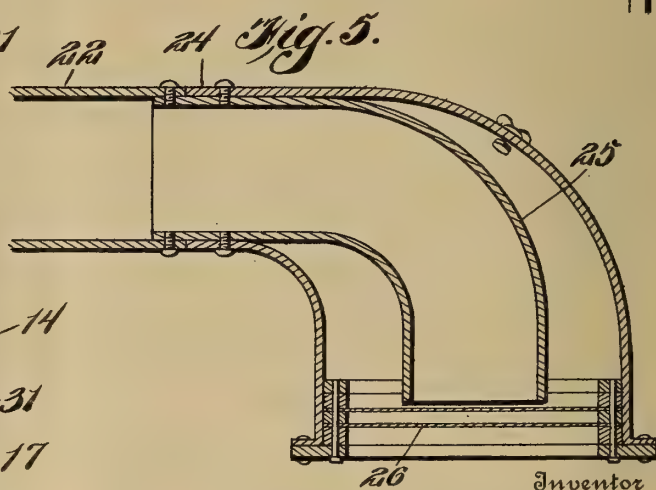
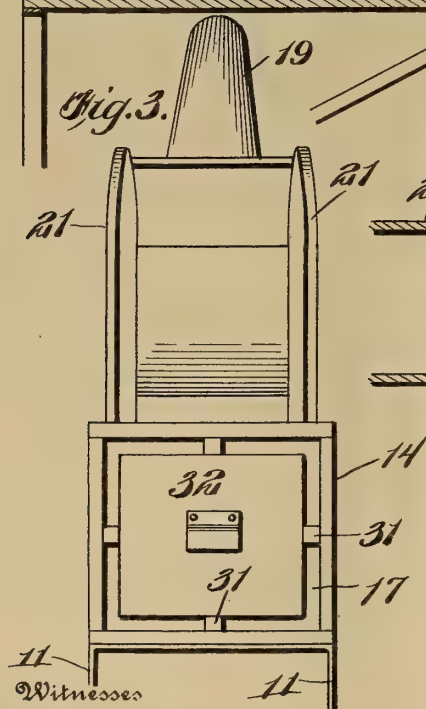
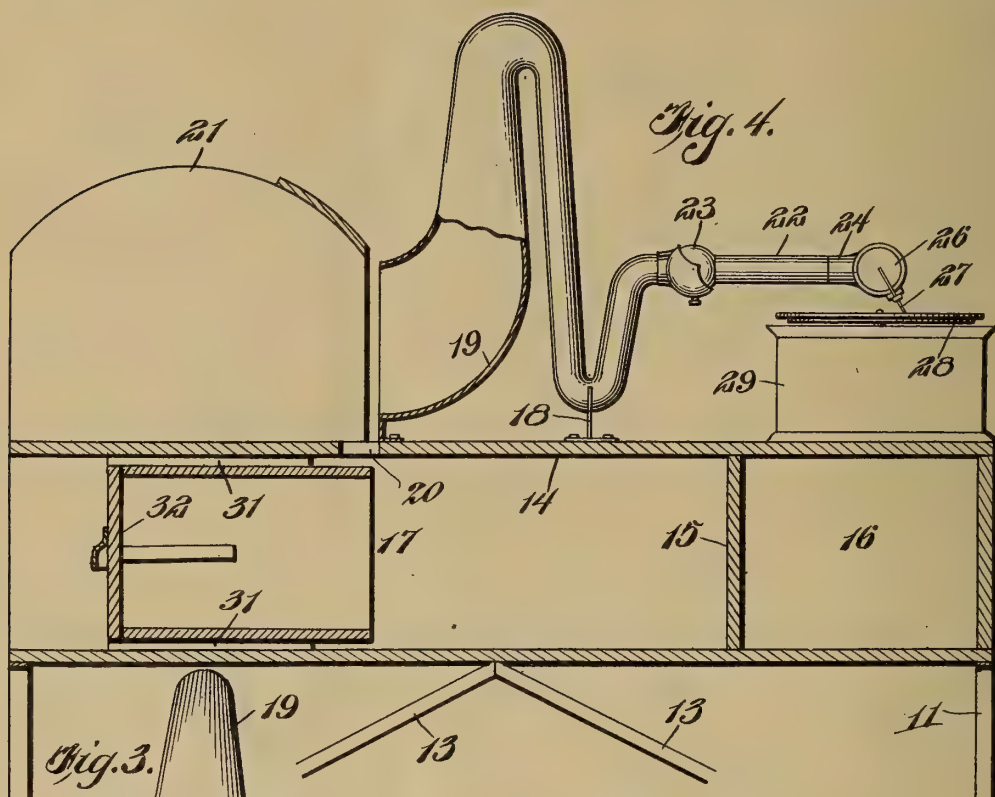






1,145,146.

Patented July 6, 1915.  
 2 SHEETS—SHEET 2.



Witnesses  
*J. H. Heinrichs*  
*H. H. H. H.*

Inventor  
*John Johnson*

By *Victor J. Evans*  
 Attorney



# UNITED STATES PATENT OFFICE.

JOHN JOHNSON, OF OLONGAPO, PHILIPPINE ISLANDS.

## PHONOGRAPH.

1,145,146.

Specification of Letters Patent. Patented July 6, 1915.

Application filed April 25, 1914. Serial No. 834,482.

*To all whom it may concern:*

Be it known that I, JOHN JOHNSON, a citizen of the United States, residing at Olongapo, in the Philippine Islands, have invented new and useful Improvements in Phonographs, of which the following is a specification.

The invention relates to talking machines, and has for an object to provide a phonograph which will clearly and distinctly reproduce vocal, instrumental or other sounds and whereby the pitch of musical notes can be varied.

In the further disclosure of the invention reference is to be had to the accompanying drawings, constituting a part of this specification, in which similar characters of reference denote corresponding parts in all the views, and in which:

Figure 1 is a side elevation of the phonograph; Fig. 2 is a plan view; Fig. 3 is a front elevation; Fig. 4 is a partial vertical longitudinal sectional view of the structure shown in Figs. 1 and 2; and Fig. 5 is a fragmentary enlarged sectional view showing in detail the construction of the tone arm.

Referring more particularly to the views, I provide a base 10 consisting of a series of uprights 11 connected by horizontal braces 12 and diagonal braces 13, the said base being arranged to support a casing 14 subdivided by a partition 15 to provide a record compartment 16 and a sound regulating compartment 17. An upright 18 is supported on the casing 14 and carries a suitable horn 19 having its open end flared and arranged to terminate adjacent a transverse opening formed in the top wall of the sound regulating compartment 17, a plurality of relatively spaced sound guiding plates 21 being supported on the top wall of the compartment 17, with the open end of the horn lying adjacent to the inner ends of the plates as shown. The other end of the horn has a tone arm 22 mounted to swing and to turn thereon by means of a universal coupling 23 and the said tone arm 22 consists, more particularly, of a tubular outer member 24 having a flared end and within which is arranged a tubular inner member 25, the said tubular inner member having its inner end secured within the tubular outer member and its free end lying within the flared portion of the tubular outer member and spaced

from the side walls thereof. A reproducer 26 is mounted to turn on the flared end of the tubular outer member 24 and carries a stylus 27 adapted to operate over a record tablet 28 supported on a box 29 carrying a suitable mechanism (not shown), for rotating the record tablet 28, it being thus apparent that when rotation is imparted to the record tablet having a sound record thereon the stylus 27 bearing on the record will transmit the sound through the horn 19 in the usual manner and the same as in the ordinary phonographs now in use.

A series of longitudinal guide strips 31 are secured to the inner walls of the sound regulating compartment 17 and mounted to slide thereon is a regulating member 32 movable longitudinally within the compartment, thus restricting the open end of the compartment, as will be readily apparent by referring to the views, it being further noted that the said member 32 can be moved toward or away from the transverse opening 20 formed in the upper wall of the compartment and which lies adjacent to the flared or mouth end of the horn 19.

Now referring to the views it will be apparent that when the phonograph is placed in operation the sound issuing from the mouth end of the horn 19 can be changed by advancing or retreating the member 32 in the compartment 17 for the purpose of changing the pitch of the notes which issue from the horn.

From the foregoing description it will be apparent that my device is simple in operation; will effectively change the pitch of the sound issuing from the mouth end of the horn by simply advancing or retreating the regulating member 32 in the compartment 17 and will thus permit of so regulating the resultant sound produced when the stylus operates over the record tablet that the voice of a person can be raised or lowered in tone to suit the operator.

Although I have shown a particular form of my invention in the drawings forming a part of this specification, it will be understood that I do not limit myself to the specific construction disclosed; that various departures may be made without departing from the spirit of the invention and that the scope of the invention is defined in the appended claims.

Having thus described my invention, I claim:

1. In a phonograph, a casing, an amplifying horn supported on the casing, sound guiding plates on the casing and in juxtaposition to said horn, with an opening formed in the casing between said guiding plates, and a regulating member arranged to slide in the casing adjacent the opening  
5  
10 therein.

2. In a phonograph, a casing, an amplifying horn supported on the casing, sound guiding plates on the casing and in juxtaposition to said horn, with an opening formed  
15 in the casing between said sound guiding plates, a regulating member arranged to slide in the casing adjacent the opening

therein, and guide strips in the casing to slidably support the regulating member therein.

3. In a phonograph, a casing having an opening, an amplifying horn on the casing and having its open end adjacent the opening in said casing, and a regulating drawer sliding in an open ended chamber in the casing adjacent the opening in juxtaposition to the open end of said horn.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN JOHNSON.

Witnesses:

G. LEYOG,  
APOLONIO CABATTI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND RECORD AND THE PRODUCTION THEREOF,  
#1,145,360-----V. H. Emerton,  
Patented-July 6, 1915.  
Filed-January 7, 1914.

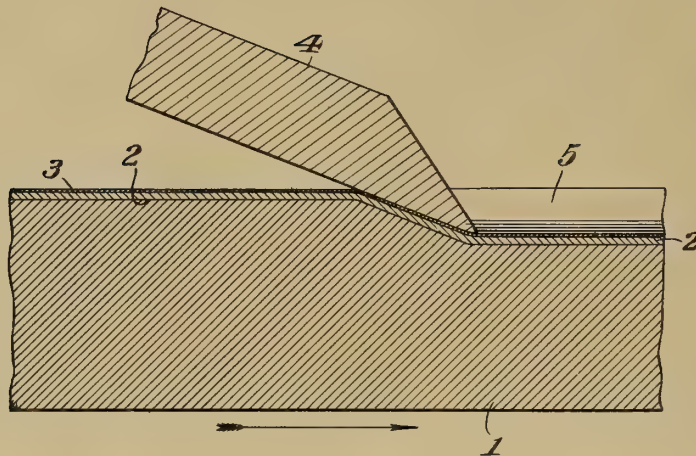


V. H. EMERSON.  
SOUND RECORD AND THE PRODUCTION THEREOF.  
APPLICATION FILED JAN. 7, 1914.

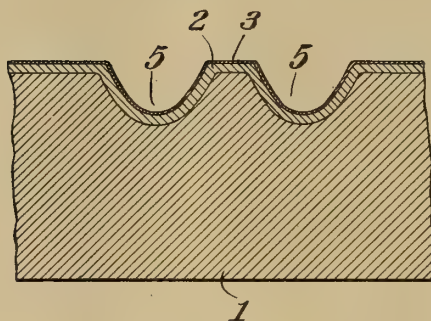
1,145,360.

Patented July 6, 1915.

*Fig. 1*



*Fig. 2*



Witnesses:  
Jas. H. Anderson.  
Ruth C. Fitzhugh.

Victor H. Emerson Inventor  
By his Attorneys  
Mauro, Cameron, Lewis & Hassie

# UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SOUND-RECORD AND THE PRODUCTION THEREOF.

1,145,360.

Specification of Letters Patent. Patented July 6, 1915.

Application filed January 7, 1914. Serial No. 810,835.

*To all whom it may concern:*

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, and a resident of the city, county, and State of New York, (whose post-office address is 102 West Thirty-eighth street, New York city, New York,) have invented a new and useful Improvement in Sound-Records and the Production Thereof, which invention is fully set forth in the following specification.

This invention relates primarily to sound-records having laterally-undulating sound-grooves and known as "zigzag records," and consists of a new recording-material, a new arrangement of devices for producing the record-grooves, a new process of producing the grooves, and the new sound-record itself.

Sound-records have hitherto been made by the use of cutting-tools whose sharp edges operate to cut the material out and remove it from the tablet leaving cleanly-cut record-grooves. It has also been proposed to make sound-records by a tool which should merely plow, or otherwise trace, its path through the surface of the tablet without cutting out and removing the material; but such plowing-action, or displacement, causes an upheaval of the material in the form of ridges forced up on both sides of the groove, which have to be removed by subsequent treatment.

The object of the present invention is to employ the displacing-operation without producing upheaval of the material above the normal surface of the tablet.

In carrying out the invention the body of the recording-tablet is formed of a yielding and compressible material that can be forced downward (with slight tendency to upheaval); and this is covered with a cohesive surface or skin, which prevents or smothers any tendency to upheaval; and a sharp-edged recording-stylus is used,—not, however, in the usual manner, but by being dragged backward—to provide sharply-defined indentations in the sides of the grooves.

The invention may be practised in different ways and with different materials, but will be best understood by reference to the accompanying drawings and the annexed description, which relate to a preferred embodiment thereof for producing a zigzag record-groove upon a flat tablet, pref-

erably a disk having the record-groove arranged spirally thereon.

In the drawings, Figure 1 is a sectional view, greatly enlarged in size, taken longitudinally through a partly-finished record-groove and a fragment of the tablet, showing the lower portion of the recording-stylus in operative position; and Fig. 2 is a sectional view, on the same scale, taken transversely through two record-grooves and a portion of the tablet.

The body of the tablet 1 is composed of a plastic and compressible material, such as a mixture of beeswax and resin, preferably half and half, and which may be warmed up immediately before making a record. The surface of the tablet is covered with a skin 2 of tin-foil or the like; and, preferably, the upper surface of the tin-foil may be treated to a light graphiting to reduce friction. In the drawings the thickness of the tin-foil 2 is very much exaggerated and the graphite film 3 is enormously exaggerated. The usual stylus employed in cutting out zigzag record-grooves (and connected to the diaphragm of a sound-box, not shown) is represented at 4; but, instead of cutting its way forward (toward the right in Fig. 1) it is dragged in the opposite direction, with its point rearward. In actual practice, of course, the stylus is not advanced, but the record-tablet itself is propelled beneath the stylus by any well-known mechanism (not shown). In Fig. 1 the tablet is supposed to be traveling toward the right, as indicated by the arrow, and the stylus 4 is engaged in producing the record-groove 5. The sharp edge of this dragging-stylus 4 does not cut the material 1, but (in the absence of the tin-foil skin 2) it might perform some scraping-action, and certainly its displacing-action would cause the upheaval of some of the material (as ridges on the sides of the groove). But the tin-foil or other skin 2 protects the surface of the recording-material 1 from being scraped or otherwise removed by the stylus; the material is compressed downwardly; and the tin-foil 2 is embossed (under more or less tension or stress), as indicated in Fig. 2. This stretching of the tin-foil prevents or smothers any upheaval of the material 1. When the stylus is vibrated laterally, in recording, its sharp edges serve to produce

clearly-defined transverse indentations in the walls of the record-groove.

The result in practising the invention is a record-tablet having a smooth plane surface, unbroken except by the concavities of the clearly-defined record-grooves, and without any furrows rising above the normal level; and the (graphited) tin-foil or other skin remains as an unbroken surfacing that extends not only over the plane surface but down the sides and in the bottoms of the grooves. The original sound-record thus produced could be employed directly upon a suitable talking-machine, for obtaining audible reproductions; but it is primarily intended as a "master" from which to make duplicate records, as by the well-known electroplating process, since its surface is already electro-conductive.

The invention may be carried out within

a wide range of modifications, and is not limited to the precise ingredients and details above set forth.

The invention having thus been fully described, what is claimed is:

The process of making a sound-record, which consists of displacing a compressible material by dragging a sharp-edged stylus backward along the surface thereof, vibrating the same by and in accordance with sound-waves, and simultaneously preventing and smothering any upheaval of said material.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

RALPH L. SCOTT,

WALTER A. FORBUSH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

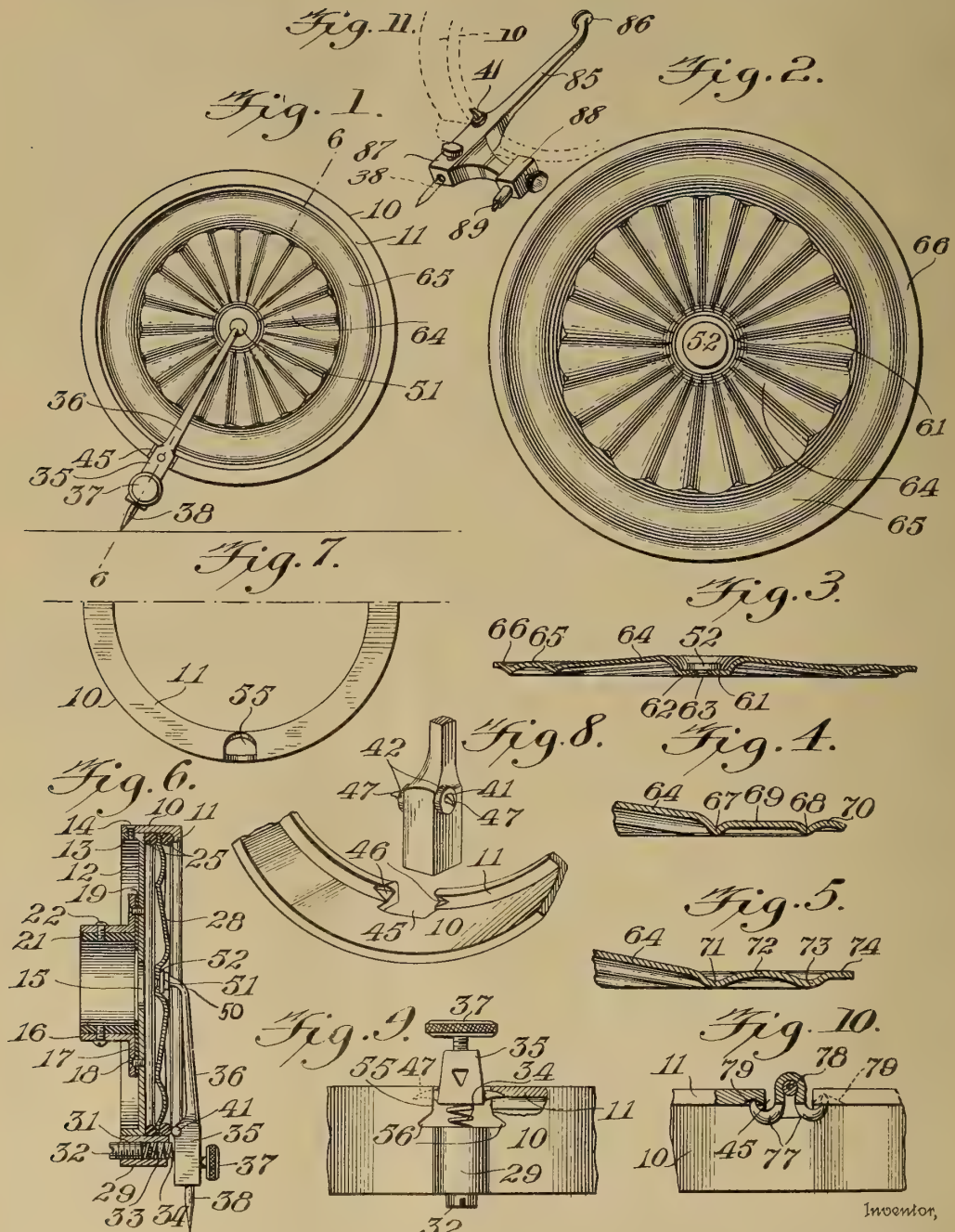


Sound box for talking machines,  
#1,145,499-----E. H: Mobley,  
Patented- July 6, 1915.  
Filed-May 11, 1914.

E. H. MOBLEY.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED MAY 11, 1914.

1,145,499.

Patented July 6, 1915.



Witnesses  
H. S. McDowell.  
N. O. Freeman.

Inventor,  
Edwin H. Mobley,  
by  
J. Stuart Freeman,  
Attorney.

# UNITED STATES PATENT OFFICE.

EDWIN H. MOBLEY, OF ROSLYN, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

1,145,499.

Specification of Letters Patent.

Patented July 6, 1915.

Application filed May 11, 1914. Serial No. 837,638.

*To all whom it may concern:*

Be it known that I, EDWIN H. MOBLEY, a citizen of the United States, and a resident of Roslyn, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a description.

The object is to provide an improved and simplified stylus bar mounting for sound boxes for talking machines, and particularly with relation to the manner of mounting the stylus bar comprising a part of the sound box covered by my Patent No. 855,326, issued May 28, 1907.

Another object is to provide an improved and simplified mounting for the stylus bar covered by my Patent No. 899,256, issued September 22, 1908.

Still another object is to provide an improved diaphragm for sound boxes over that covered by my Patent No. 834,629, issued, October 30, 1906, and Patent No. 648,975, issued, May 8, 1900.

A further object is to provide a support for a stylus bar in the substantially regularly curved sound box casing proper, without necessitating the addition thereto of an integral or otherwise attached projection.

Another object is to provide a substantially invisible support for the stylus bar, located within the casing. Additional objects and advantages of the invention are hereinafter fully brought out in the following specification when read in conjunction with the accompanying drawings, in which—

Figure 1 is a front elevation of a sound box comprising the preferred embodiment of the invention; Fig. 2 is an enlarged detail view of the diaphragm employed; Fig. 3 is a diametrical section of the same; Fig. 4 is a fragmentary section of a modified form of diaphragm; Fig. 5 is a similar view of still another modification; Fig. 6 is a diametrical section on the line 6—6 of Fig. 1; Fig. 7 is a fragmentary elevation of a modified form of sound box casing; Fig. 8 is a fragmentary perspective view of the improved manner of mounting the stylus bar; Fig. 9 is an enlarged fragmentary view of the stylus bar mounting employed in the modification shown in Fig. 7, the same being partly in section; Fig. 10 is an enlarged detail sectional view of the manner of mounting the stylus bar of my

Patent No. 899,256 in accordance with the present invention; and Fig. 11 shows a form of stylus bar adapting a sound box to either laterally or vertically directed record undulations.

Referring to the drawings, the invention in its preferred form comprises a cylindrical casing 10, turned inwardly at its forward edge portion to form a flange 11 and partially closed at the rear by a back-plate 12, provided on its peripheral edge with a substantially cylindrical flange 13, adapted to frictionally coöperate with the inner surface of said casing and secured in place in any suitable manner, as by the screws 14. The plate 12 is provided with a central opening 15 and has firmly secured thereto and in axial alinement with said opening, a tone arm or sound conveyer coupling 16, provided with a radially extending flange 17, secured to said plate by suitable means 18, but insulated therefrom by a washer 19, the inner surface of the coupling being provided with a cylindrical washer 21, secured in place by screws 22, or by any other desired means. Positioned within said casing between and bearing against the flange 11 and peripheral edge portion of the inner face of the back-plate 12, are two annular washers 25, preferably made of rubber and in cross section either solid, or circular and hollow, between which is supported the improved form of diaphragm 28. On the outside of the casing and either integral therewith, or unitarily secured thereto as by soldering or brazing, is a member 29, provided with an axially extending bore 31, threaded and adapted to receive a screw 32 carrying an axial extension 33, and a suitable form of spring or other form of resilient member 34 surrounding said extension. The outer end of the spring presses against the rear surface of the head 35 of a stylus bar 36, said head being provided with the usual thumb-screw 37, operative to secure in said head any desired form of stylus 38. Adjacent to the upper terminus of the head 35, said stylus bar is preferably drilled and provided with a pin 41 surrounded by washers 42, operative to space the bar from the adjacent portions of the casing when in normal position. The front of said casing is recessed at 45, to permit the passage of the stylus bar therethrough, and the adjacent portions of the inner surface of the flange 11 are gouged or notched to form substan-



tially V-shaped recesses 46 for the reception of the ends 47 of the pin 41, said ends being preferably curved, tapered and angularly shaped or rounded in cross section, to present an antifrictional engagement between these relatively movable elements.

The inner end of the stylus bar is transversely curved at 50 and enlarged to form a head 51 adapted to bear against the diaphragm directly, or against an interposed protecting or stiffening plate 52, secured to said diaphragm in any suitable manner. The head of the stylus bar may be recessed on its under side to receive the extreme end portion of the spring 34, and, when mounted in operative position, the tension of the bar on the diaphragm is readily and finely adjusted or regulated by the screw 32, the combined outward pressures of the spring and diaphragm operating to firmly seat the ends of the pin 41 in position in the recesses 46.

In the modified form of the device shown in Figs. 7 and 9, the inwardly directed flange 11 is of somewhat greater extent and is recessed at 55 substantially as shown in said figures, in which case, as it is impossible to place the stylus bar in position by tilting the same inwardly before the diaphragm is positioned and then moving the ends of the pin 41 around the flange and backwardly into the recesses provided therefor, there are provided offsets 56 to said recess in the outer cylindrical surface of the casing, as shown in Fig. 9 and through these offsets the stylus bar supporting pin is readily inserted. This embodiment of the device possibly presents a better appearance than the former, but also acts to reinforce the flange 11, as well as to conceal substantially entirely the pin support. In other ways there is no substantial difference between the preferred and modified forms as herein described.

The form of diaphragm illustrated in Figs. 2 and 3 comprises in general a substantially flat central portion 61, provided with a central aperture 62, through which is secured a riveted projection 63 of the stiffening plate 52. Surrounding this portion 61 is a radially corrugated annular portion 64, having the function of the similarly raised portion of the diaphragm illustrated in Patent No. 648,975, the corrugations of said portion being bounded by an annular corrugation 65, immediately adjacent thereto but distinct therefrom. Finally, the extreme edge portion of the diaphragm constitutes a semi-corrugation 66, extending in the same direction as the adjacent corrugation 65, this construction creating, under otherwise exactly similar circumstances, an increased purity of the tone produced, while the characteristics of the tone are radically altered.

The modification of the diaphragm shown

in Fig. 4 presents a relatively narrow rounded corrugation 67 next to the portion 64, while a second annular corrugation 68, similar to the last, is spaced therefrom by a relatively flat annular portion 69, the edge portion of the diaphragm beyond the latter corrugation comprising a reversely curved section 70.

Fig. 5 shows the raised portion 64 of the diaphragm merging into an annular corrugation 71, adjacent to which is the reversely directed corrugation 72, in turn terminating in a corrugation 73, similar to the first corrugation, the extreme outer portion of the diaphragm lying substantially in a plane at 74.

Fig. 10 shows the method of mounting the stylus bar of Patent No. 899,256, on a sound box casing constructed in accordance with the present invention. The outwardly and reversely curved portions 77 of the body portion 78 of the stylus bar are pointed and adapted to enter and coöperate with the innermost portions of the recesses 79 provided therefor in the inner face of the flange 11 of the casing 10 and adjacent to the aperture 45. The stylus bar is held in place by the usual spring and diaphragm as hereinbefore described.

A form of stylus bar which is particularly adaptable to the improved sound box above described, is shown in Fig. 11 and comprises a shank 85, inwardly bent diaphragm-engaging portion 86 and integral stylus receiving head portion 87. The bar is provided with the preferred form of transversely extending supporting pin 41, while the head 87 has secured thereto yet spaced therefrom an auxiliary head 88 upon the outer side thereof and adapted to receive and support a suitable steel or permanent stylus 89. With a stylus in the head 87, a sound box equipped with this form of stylus bar is capable of reproducing a record of sound carried by a laterally undulatory groove, while a stylus in the head 88 makes the sound box capable of reproducing a record of sound carried by a vertically undulatory, or "hill-and-valley," groove.

Although sound boxes constructed in accordance with this invention reproduce records in either form of groove equally well, the exact operation of the stylus bar upon its pivotal support is not entirely and accurately understood.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States, is:—

1. A sound box, comprising a casing, a stylus bar, and a diaphragm and a spring coöperating with said bar in opposed relation, said bar being pivotally mounted directly upon the inner surface of said casing facing and adjacent to said diaphragm.

2. A sound box, comprising a hollow cas-

ing, having a radially, inwardly directed flange provided with an opening, a stylus bar, oppositely disposed tapered extensions from said bar extending within said casing, and a diaphragm and a spring coöperating with said bar in opposed relation, and together maintaining said extensions in pivotal engagement with the inner surface of said flange.

3. A sound box comprising a hollow casing having a radially, inwardly directed extension, a stylus bar, an extension from said bar operative to engage the inner surface of said first extension, and a diaphragm and a spring coöperating with said bar in opposed relative, and together maintaining said bar extension in pivotal engagement with the inner surface of said first-named extension.

4. A sound box comprising a casing having a radially, inwardly projecting flange provided with an opening, the inner surface of said flange being recessed adjacent to said opening, a stylus bar, oppositely disposed, tapered extensions from said bar extending within said casing and pivotally engaging the inner surface of said flange in said recesses, and a diaphragm and a

spring coöperating with said bar in opposed relation, to maintain said bar extensions in operative position.

5. A sound box comprising a casing having a radially, inwardly projecting flange provided with an aperture at one side, and a stylus bar extending through said aperture and provided with laterally extending tapered shoulders in turn provided on one side with knife edges, said edges pivotally engaging within recesses in said flange on the inner side of the latter and adjacent to said aperture.

6. A sound box, comprising a hollow casing, having a radially inwardly directed flange, a stylus bar, oppositely disposed extensions from said bar extending within said casing, and a diaphragm and a resilient means coöperating with said bar in opposed relation, and together maintaining said extensions in pivotal engagement with the inner surface of said flange.

In witness whereof, I have hereunto set my hand this 24th day of April, A. D., 1914.

EDWIN H. MOBLEY.

Witnesses:

HELEN G. DALEY,  
W. S. McDOWELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





SOUND BOX FOR TALKING MACHINES,  
# 1,145,535-----C. E. Woods,  
Patented-July 6, 1915.  
Filed- July 14, 1914.

C. E. WOODS.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED JULY 14, 1914.

1,145,535.

Patented July 6, 1915.

Fig. 1.

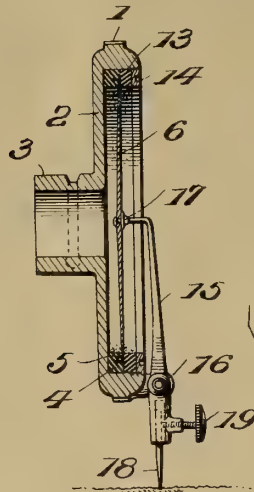


Fig. 5.

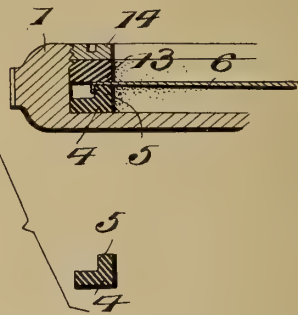


Fig. 4.

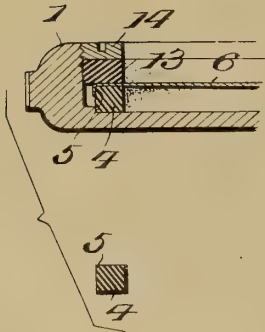


Fig. 2.

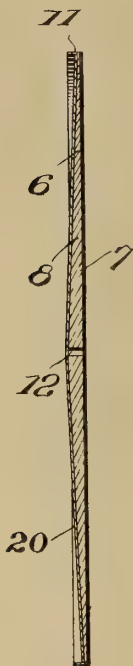


Fig. 3.

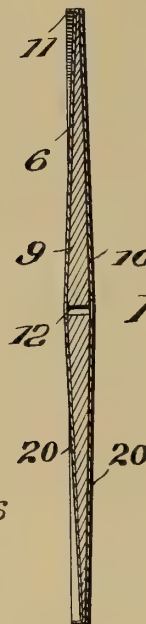
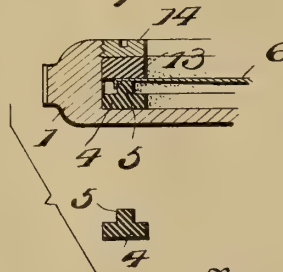


Fig. 6.



Inventor

Clinton E. Woods

Witnesses  
R. C. Fitzhugh.  
J. B. Uegenast.

By  
Mauro Cameron Lewis & Macie  
Attorneys

# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SOUND-BOX FOR TALKING-MACHINES.

1,145,535.

Specification of Letters Patent. Patented July 6, 1915.

Application filed July 14, 1914. Serial No. 850,889.

### *To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have  
5 invented a new and useful Improvement in Sound-Boxes for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to reproducers for  
10 talking machines, and has for its objects to improve the quality of the sound reproductions obtained by the use of such reproducers, to cheapen the construction thereof, and to provide an instrument of this character  
15 which may be subjected to ordinarily rough handling without danger of destroying or injuring the delicate diaphragm thereof.

In reproducers as heretofore constructed,  
20 a great variety of materials have been employed for the diaphragms, such as metal, mica, glass, etc., all of which were open to more or less serious objections. Mica diaphragms, generally speaking, have given the  
25 best results, but they are the most expensive. Some metal diaphragms, and particularly diaphragms of aluminium, have given very superior results, and the same can be cheaply manufactured, but as heretofore constructed  
30 they are open to the objection that the metal is easily buckled or distorted by any slight blow on the reproducing needle or needle bar, thereby destroying the same as a means of obtaining a reproduction of fine quality.  
35 Glass diaphragms have also given good results, but glass is fragile and easily broken.

Among the metals, aluminum has long been recognized as possessing very superior acoustic properties, and as being a most excellent substance from which to construct  
40 diaphragms, but for the fact that when the diaphragm was made sufficiently delicate to take advantage of the superior qualities of the metal for reproducing purposes, it would  
45 become buckled after short use, and in fact had to be handled very carefully in assembling the parts of the reproducer to insure desirable results when it was new. So great

have been the difficulties encountered in the use of an aluminum reproducer that, notwithstanding its recognized desirable qualities as a metal for giving reproductions of superior quality, its commercial use has in many instances been abandoned for that of the more expensive mica diaphragms. 55

One of the objects of my invention, therefore, is to provide a reproducer with a metal diaphragm and more specifically an aluminum diaphragm, thereby taking advantage of the recognized superior quality of  
60 this metal for such purpose, and to so construct the diaphragm and other parts of the reproducer that the buckling, distortion and other objections that have heretofore prevented the extended use of aluminum and  
65 other metal diaphragms may be entirely avoided.

With these objects in view, the invention consists in a reproducer or other sound-box (such as a recorder) provided with a metal-  
70 lic diaphragm, preferably of aluminum, and preferably thickest at its center and gradually diminishing in thickness toward the periphery of the diaphragm, the periphery being provided with an upturned flange  
75 preferably at approximately right angles to the plane of the diaphragm itself. This diaphragm is made of less diameter than the interior diameter of the sound-box itself, and in order to insure that no part of the dia-  
80 phragm shall come in contact with the metal of the sound-box casing itself, and for the further purpose of holding the diaphragm with great firmness in its position in the sound-box, there is provided an annular gas-  
85 ket of elastic material, such as rubber or cork, which is provided with an annular shoulder whose external diameter is less than the internal diameter of the sound-box casing, which shoulder is engaged by the  
90 flange of the diaphragm. When the diaphragm is in position with its flange engaging the shoulder of the gasket, it is held firmly in place by any suitable retaining means, as for example a screw bezel or ring,  
95 preferably with a gasket of suitable elastic



material, as rubber or cork, interposed between the retaining member and the face of the diaphragm.

The inventive idea involved is capable of receiving a variety of mechanical expressions, some of which, for the sake of illustrating the invention, are shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only, and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings Figure 1 is a central transverse section through a reproducer embodying my invention, with the stylus bar, the stylus and the retaining screw shown in elevation; Fig. 2 is a central transverse section of a diaphragm on an enlarged scale, in which one face of the diaphragm is a plane surface, while the other face gradually tapers from the center toward the periphery thereof; Fig. 3 is a like section of a diaphragm in which the thickness of the diaphragm gradually tapers on both faces from the center toward the periphery thereof; and Figs. 4, 5 and 6 show some of the forms which the shouldered gasket may assume.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, 1 is a sound-box casing of metal or any suitable material, cup-shaped as shown, and provided with the usual back wall or bottom 2 and neck 3, by means of which it is connected to the tone-arm of the machine. Seated within the casing 1 is an annular gasket 4 of any suitable elastic material, as rubber or cork, and this gasket is provided with an annular shoulder 5 on that face of the gasket which is turned outward from the back or wall 2 of the casing 1, the external diameter of said shoulder being less than the internal diameter of the casing. Different forms of gaskets provided with such shoulder are shown in Figs. 1, 4, 5 and 6. In Fig. 1 the shoulder is formed by an annular slit in the gasket face. Fig. 4 shows the gasket of simple rectangular form in cross section, while Figs. 5 and 6 show the gasket with an annular rib forming said shoulder.

6 is the diaphragm of any suitable metal, such as aluminum, said diaphragm being thickest at its center and tapering gradually from the center to the periphery. The thickness of the central portion of the diaphragm may vary within limits, as well as the thickness of the peripheral portion thereof. I have found that very superior results are obtained by making the central portion, when the diaphragm is of aluminum, about .015 of an inch, and the thickness at the periphery about .004 of an inch. The diaphragm may be made with one face thereof plane,

as shown at 7 in Fig. 2, and the other face thereof tapering, as shown at 8 in said figure, or both faces may taper from the center toward the periphery, as shown at 9 and 10 (Fig. 3). The diaphragm having been formed with the desired taper, is then provided with a peripheral flange 11. Preferably in imparting this form to the diaphragm, a circular disk of the metal is cut from a sheet thereof having approximately uniform thickness, and it is then struck several blows in a suitable die with a proper hammer. This serves, not only to impart the tapering thickness to the diaphragm, but also to harden the metal and impart to the same a uniform molecular construction. The disk having been thus treated, the flange 11 is then formed thereon by drawing in suitable dies, or otherwise, and a suitable perforation 12 having been provided in the center thereof, the diaphragm is placed in position with the flange 11 engaging the shoulder 5 on the gasket 4. Preferably a second annular gasket 13 of cork, rubber or other elastic material is then placed against the outer face of the diaphragm, as is common in this art, and the parts are secured in position by any suitable retaining means, as for example, a screw bezel or ring 14. Any suitable stylus bar 15, fulcrumed upon the frame of the sound-box, as at 16, is then secured by suitable means to the center of the diaphragm at 17, said stylus bar being provided with the usual stylus 18 and retaining screw 19.

With the parts thus constructed and assembled, it will be found that there is provided a reproducer which will reproduce recorded sounds with great faithfulness and accuracy, and of remarkably fine quality, and in which the diaphragm will not buckle or become distorted under the roughest usage.

For the purpose of protecting the surface of the diaphragm from atmospheric action, and for the further purpose of enhancing the appearance of the diaphragm, I apply decalcomanias 20 on one or both faces of the diaphragm, and I have discovered that the fine quality of the reproductions obtained is in no way impaired when such decalcomanias are employed.

While I have, for convenience of description, herein referred to my invention as applied to a reproducer, it will be apparent to those skilled in the art that the same is equally applicable to sound-boxes for talking machines, whether the same be employed for recording or reproducing sound, and the claims hereto appended are intended to include both forms of sound-box.

I am aware of the fact that it has heretofore been proposed to provide a diaphragm with a peripheral flange, and also that it



has been proposed to construct diaphragms which are thickest at their centers and taper toward the periphery. And I do not broadly claim either of these constructions *per se* as of my invention, but

What I do claim is:—

1. In a sound-box for talking machines, the combination of a frame or casing having an annular seat, a gasket of elastic material seated therein said gasket having an annular groove formed in that face on the opposite side from said seat, a diaphragm having a peripheral flange engaging the groove in said gasket, and means retaining said diaphragm in position.

2. In a sound-box for talking machines, the combination of a frame or casing having an annular seat, a gasket of elastic material seated therein said gasket having an annular groove formed in that face on the opposite side from said seat, a diaphragm thickest at its center and tapering toward its periphery and having a peripheral flange engaging the groove in said gasket, and means retaining said diaphragm in position.

3. In a sound-box for talking machines, the combination of a frame or casing having an annular seat therein, a gasket of elastic material seated therein and having an annular groove formed in that face on the opposite side from said seat, a metal diaphragm, peripherally flanged, thickest at its center and tapering toward its periphery, with its flange entering the groove in said gasket, and means retaining said diaphragm in position.

4. In a sound-box for talking machines, the combination of a frame or casing having an annular seat therein, a gasket of elastic material seated therein and having an annular groove formed in that face on the opposite side from said seat, an aluminum diaphragm, peripherally flanged, thickest at its center and tapering toward its periphery, with its flange entering the groove in said gasket, and means retaining said diaphragm in position.

5. In a sound-box for talking machines, the combination of a cup or casing, a resilient diaphragm-support or gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, a diaphragm of less diameter than said casing and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

6. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, a metal diaphragm of less diameter than the internal diameter of said casing and having a peripheral flange engaging said shoulder,

and means retaining said diaphragm in position.

7. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, an aluminum diaphragm of less diameter than the internal diameter of said casing and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

8. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, a metal diaphragm thickest at its center and tapering toward its periphery and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

9. In a sound-box for talking machines, the combination of a casing, an annular gasket seated therein and provided with an annular shoulder of less diameter than the internal diameter of said casing, an aluminum diaphragm thickest at its center and tapering toward its periphery and having a peripheral flange engaging said shoulder, and means retaining said diaphragm in position.

10. In a sound-box for talking machines, the combination of a casing and a flanged aluminum diaphragm of less diameter than the internal diameter of said casing, with resilient means supporting said diaphragm in said casing but out of contact therewith.

11. In a sound-box for talking machines, the combination of a casing and a peripherally flanged aluminum diaphragm thickest at its center and tapering toward its periphery, with resilient means supporting said diaphragm in said casing but out of contact therewith.

12. In a sound-box for talking machines, a diaphragm having a decalcomania protecting coat or covering on the face thereof.

13. In a sound-box for talking machines, the combination of a metal cup, an annular gasket seated therein and having a slit or groove formed in that face opposite to its seating face, a peripherally flanged aluminum diaphragm thickest at its center and tapering from its center toward its periphery and with its flange entering the slit or groove in said gasket, a second annular gasket over said diaphragm, and means retaining said parts in position.

14. In a sound-box for talking machines, the combination of a casing, a peripherally flanged aluminum diaphragm of decreasing thickness from its center to its periphery, and a pair of annular elastic gaskets between which said diaphragm is held at its

periphery, one of said gaskets having an annular shoulder engaged by the flange on the diaphragm.

15. In a sound-box for talking machines,  
5 the combination of a casing, a peripherally flanged diaphragm thicker at its center than at its periphery, and a pair of annular elastic gaskets between which said diaphragm is held at its periphery, one of said gaskets

having an annular shoulder engaged by the 10 flange on the diaphragm.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

LAURETTA T. NEAL,  
J. S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



TALKING MACHINE,

#1,146,360-----E. R. Johnson & W. N. Dennison,  
Patented-July 13, 1915.  
Filed-September 6, 1902.

E. R. JOHNSON & W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED SEPT. 6, 1902.

1,146,260.

Patented July 13, 1915.

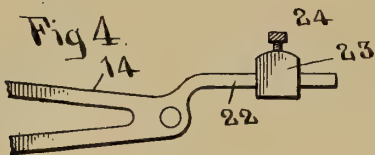
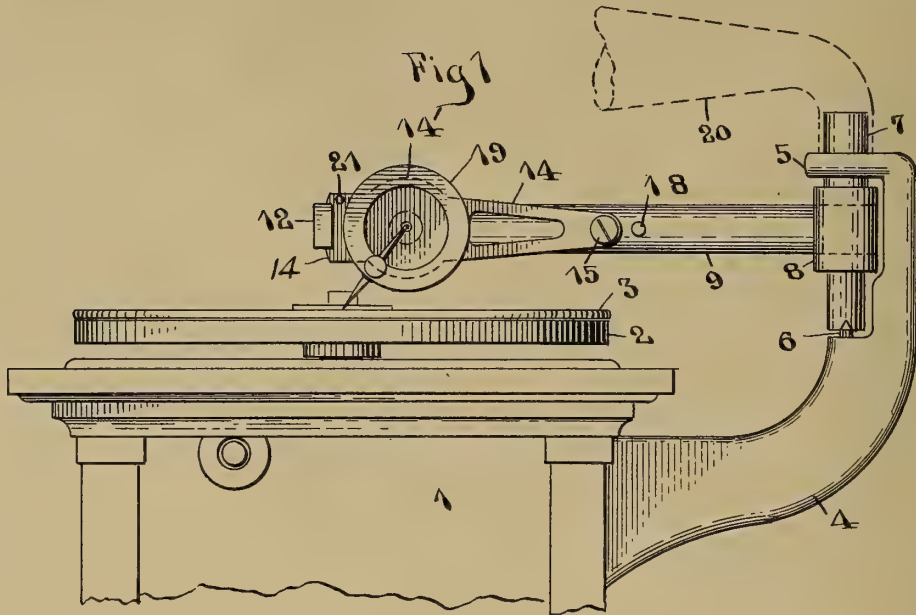


Fig 2.

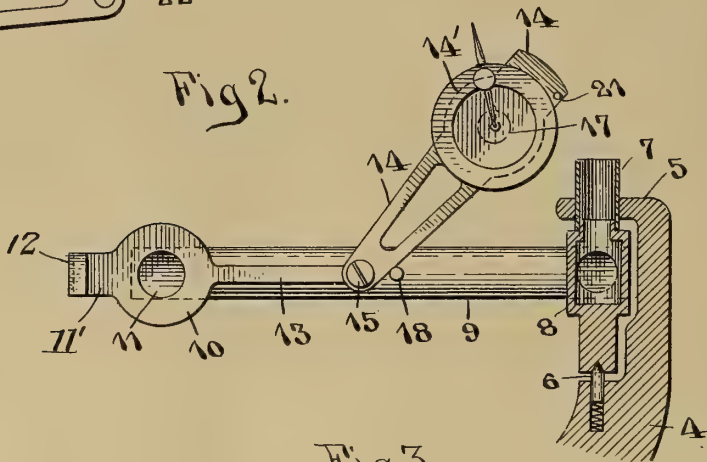
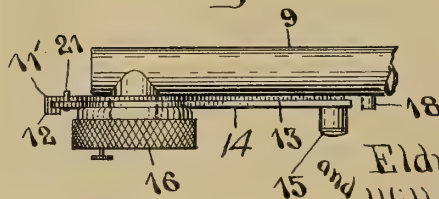


Fig 3.



WITNESSES:

Edw. W. Vaill Jr.

Chas. K. Bennett

INVENTOR: S

Eldridge R. Johnson  
and Wilburn N. Dennison.

by Horace Pettit  
ATTORNEY:

# UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, AND WILBURN N. DENNISON, OF CAMDEN, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE.

1,146,260.

Specification of Letters Patent.

Patented July 13, 1915.

Application filed September 6, 1902. Serial No. 122,282.

*To all whom it may concern:*

Be it known that we, ELDRIDGE R. JOHNSON and WILBURN N. DENNISON, both citizens of the United States, and residents of the city of Philadelphia, State of Pennsylvania, and Camden, State of New Jersey, respectively, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

The main objects of this invention are to provide in a talking machine improved means for supporting a sound box either in coöperative relation with a record or in an inverted inoperative position above the record; to provide improved means for limiting the movement of the sound box downwardly from its operative position; to provide in combination with other elements adjustable means for counterbalancing the sound box; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary side elevation of a talking machine constructed in accordance with this invention, the parts thereof being shown as in operation; Fig. 2, a fragmentary side elevation, partly in vertical section, of a portion of the same, the parts thereof being shown in inoperative position; Fig. 3 a fragmentary top plan view of a portion of the same; and Fig. 4 a fragmentary side elevation showing a counterbalance for the sound box.

Referring to the drawings, one embodiment of this invention comprises a cabinet 1, above and upon which a turntable 2 is mounted to rotate about a vertical axis to support a horizontal disk sound record 3, the turntable being rotated by a suitable motor (not shown) arranged within the cabinet 1.

For supporting sound reproducing and sound amplifying means, a longitudinally curved supporting bracket 4 is attached at one end to the rear wall of the cabinet and extends outwardly and then upwardly therefrom and carries at its upper end and projecting inwardly therefrom a horizontal col-

lar 5. Arranged below and coaxially with the collar 5 is a spring pressed pin or pivot 6 which projects upwardly from and is carried by the bracket 4. Within the collar 5 is fixed a relatively short vertical tube 7 which projects slightly above and below the collar 5. The lower end of the tube 7 telescopes over a flange on the upper end of a hollow vertical hub 8 the lower end of which is closed and provided with a suitable recess in which engages the upper end of the pivot 6.

For supporting a sound box and for conveying sounds from the sound box to the hub 8 a substantially straight horizontal hollow cylindrical sound box arm or tone arm 9 is rigidly attached at one end to the hub 8 and communicates therewith through a suitable opening. At the outer or free end of the tone arm 9 is attached a flat vertical disk 10 through which is a circular opening 11 which communicates with the interior of the arm 9. The disk 10 has an extension 11' which projects forwardly therefrom in a plane therewith and then turns laterally outwardly at right angles thereto and then rearwardly in a direction parallel to the disk 10, to form a guide 12, the function of which will be described hereinafter. The disk 10 also has a flat extension 13 projecting rearwardly therefrom in a plane therewith and in contact laterally with the tone arm 9 and attached thereto for a considerable fraction of the length of the arm.

For connecting a sound box to the tone arm 9, a substantially flat elongated sound box frame or support 14 is pivotally connected to the arm 9 by means of a horizontal screw 15 at the inner end of the flat extension 13 on the arm, to oscillate in a vertical plane about the axis of the screw and in sliding contact with the flat surfaces of the disk 10 and its extensions 11' and 13. The frame 14 is widened near its outer end to form a disk shaped portion 14' of substantially the same diameter as the disk 10 fixed on the tone arm, the disk shaped portion 14' being arranged to be approximately coaxial



with the disk 10 when the sound box is in operation.

Fixed upon the disk shaped portion 14' of the frame 14 and substantially coaxial therewith is a sound box 16 of a well known construction and provided with an outlet 17 arranged to be substantially in line with the opening 11 in the tone arm when the sound box is in position for recording or reproducing sound, and the disk shaped portion 14' is provided with a corresponding opening to permit the sound box 16 to communicate with the tone arm 9.

To insure a practically sound tight joint between the sound box 16 and the tone arm 9 when the sound box is in operation, the outer free end of the frame 14 is arranged and proportioned to engage snugly but slidably in the guide 12 to maintain the frame in sliding contact with the disk 10 and its extensions, when the sound box is in an operative position.

To limit the rotary movement of the sound box about its pivot 15 and to support the sound box in an inverted inoperative position above a record 3 on the record support 2, a horizontal pin or stop 18 is fixed to the tone arm 9 and projects laterally therefrom into the path of the frame 14.

To limit the downward movement of the sound box 16 from its operative position with respect to the tone arm 9, to prevent the sound box from falling into contact with the cabinet 1, should the sound box be moved laterally out of contact with the record, the frame 14 is provided with a pin or stop 21 arranged to engage the upper edge of the extension 11' on the tone arm 9 at a point in the movement of the sound box when the sound box is slightly below its lowermost operative position with respect to the tone arm.

For amplifying the sounds delivered from the sound box through the tone arm 9, hub 8, and short tube 7, any suitable sound amplifier or horn 20 may be arranged to communicate with the short tube 7, the horn being preferably arranged with its smaller end in telescopic relation with the upper end of the short tube 7 and resting upon the collar 5 so that the horn may be swung about the vertical axis of the short tube 7 to deliver the sound in any desired horizontal direction.

To adjust the downward pressure of the sound box against a sound record, the sound box may be provided, as shown in Fig. 4, with an adjustable counterbalance, preferably in the form of a counterweight 23 adjustable longitudinally of a counterbalance arm 22 formed on the inner end of the frame 14 and projecting rearwardly therefrom when the sound box is in operative position. The counterweight 23 is held in

any desired position of adjustment longitudinally of its arm 22 by means of a set screw 24. By means of this adjustable counterweight the downward pressure of the stylus against the record may be adjusted so as to avoid unnecessary wear upon the record, and obviate or minimize "scratching" or "grating", thus prolonging the life of the record and improving the quality of the reproduction.

It is thought that the construction and operation of this device will be fully understood from the foregoing description. It is to be noted that in the operation of the device, the tone arm 9 swings in a plane substantially parallel to and above the record 3 and record support 2 about a vertical axis, and the sound box 16 swings laterally in unison with the tone arm 9 and also swings vertically with respect to the tone arm about a horizontal axis fixed with respect to the tone arm and extending transversely with respect to the longitudinal axis of the tone arm.

It is to be understood that this invention is not limited in its application to the specific construction hereinbefore described but might be applied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described this invention, we claim and desire to protect by Letters Patent of the United States:

1. In a sound recording or reproducing machine, the combination with a hollow arm or tube limited to move in one plane only, of a sound box carried by said arm and slidably mounted adjacent the free end of said arm to move in a direction substantially perpendicular to said plane, and having lateral communication with the interior of said arm.

2. In a sound recording or reproducing mechanism, the combination with a hollow arm or tube limited to swing in one plane only, of a sound box carried by said arm and slidably mounted at one side and adjacent the free end of said arm and adapted to move in a direction substantially perpendicular to said plane and having communication with the interior of said arm.

3. In a recording or reproducing mechanism, a record support, a hollow arm or tube pivoted to be movable only in a plane parallel to the record support, a disk having an opening therein fixed adjacent to the end of said arm, said opening communicating with the interior of said arm, a plate pivoted to the side of said arm and slidably contacting with said disk, and a sound box carried by said plate and having an opening communicating with the opening in the disk.

4. In a sound recorder or reproducer, the



combination with a hollow sound conveying arm provided with means forming a flat apertured external surface, of a sound box pivoted thereto and having a flat apertured surface slidably engaging against said first mentioned surface to establish communication between said arm and said box, said sound box being movable to move the apertures in the said sound box and arm out of communication with each other.

5. In a talking machine, the combination with a record support, of a hollow arm pivoted to move only in a plane parallel to said support, a disk fixed on said arm and having an opening communicating with the interior of said arm, means on said disk forming a guide, a sound box support pivoted to said arm and having a disk portion provided with an opening therein, means on said disk portion for engaging said guide, and a sound box mounted upon said disk portion and communicating through the opening therein with the said opening in the said arm.

6. In a talking machine, the combination with a record support, of a hollow arm pivoted to move only in a plane parallel to said support, a disk fixed on said arm and having an opening communicating with the interior of said arm, means on said disk forming a guide, a sound box support pivoted to said arm and having a disk portion provided with an opening therein, means on said disk portion for engaging said guide, a sound box mounted upon said disk portion and communicating through the opening therein with the said opening in the said arm, and a stop arranged to limit the rotary movement of said disk portion.

7. In a talking machine, a record support, a hollow sound conducting arm movable only in a plane substantially parallel with said support, a sound box mounted upon, communicating with and movable independently of said arm toward and away from the record support, and a counterbalance for said sound box independent of said arm.

8. In a talking machine, the combination with a rotary record support, of a hollow sound conveying arm, a sound box communicating with said arm and movable with respect thereto toward and away from said support, and means to counterbalance said sound box.

9. In a talking machine, the combination with a rotary record support, of a hollow sound conveying arm movable in a predetermined path, a sound box communicating with said arm and movable in unison therewith across said record support, and movable with respect thereto toward and away from said record support, and means to counterbalance said sound box.

10. In a talking machine, the combination with a record support, of a hollow arm pivoted to swing across said support, a sound box supporting plate pivoted adjacent the free end of said arm, a sound box carried by said supporting plate, and means on said supporting plate to counterbalance said sound box.

11. In a talking machine, the combination with a record support, of an arm pivoted to swing across said support, a sound box supporting plate pivoted to said arm, a sound box carried by said supporting plate, and means carried by said supporting plate and adjustable thereon for counterbalancing said sound box.

12. In a sound recorder or reproducer, a hollow sound conducting arm, a sound box mounted upon said arm communicating with and movable relatively thereto, and means rigid with said box to counterbalance said box.

13. In a sound recorder or reproducer, a hollow movable sound conducting arm, a sound box mounted upon said arm communicating therewith and movable relatively thereto, and means to counterbalance said box.

14. In a sound recorder or reproducer, a sound conveying arm having a flat apertured external portion, a sound box pivoted to said arm and having a corresponding flat apertured external portion bearing against said flat portion of said arm to establish communication between said arm and said box, and means to counterbalance said box.

15. In a sound recorder or reproducer, a sound conveying arm having a flat apertured external portion, a sound box pivoted to said arm and having a corresponding flat apertured external portion bearing against said flat portion of said arm to establish communication between said arm and said box, and a lateral extension on the box to counterbalance said box.

16. In a recording or reproducing mechanism, the combination with a record support and a hollow sound conveying arm pivoted at one end to swing across the face of the record support, a sound box pivoted adjacent the free end of said arm and communicating therewith, and means to counterbalance said box.

17. In a sound recording or reproducing apparatus, a sound conveying arm having an opening therein, a sound box carried by said arm and movable with respect thereto into and out of communication with said opening about an axis transverse to the longitudinal axis of said arm, and means limiting the motion of said box about said axis.

18. In a sound recording or reproducing apparatus, a movable sound conveying arm having an opening therein, a sound box car-

ried by said arm and movable into and out of communication with said opening about an axis transverse to the longitudinal axis of said arm, and means to hold said box in an inoperative position.

19. In a sound recorder or reproducer, a record support, a sound conveying arm movable over the face of the record support, a sound box pivoted to said arm, communicating therewith and movable independently thereof, and a stud carried by said arm whereby said box may be held out of operative position.

Signed by me, the said ELDRIDGE R. JOHN-

SON, at Philadelphia, Pennsylvania, this 15 26th day of August, A. D., 1902.

ELDRIDGE R. JOHNSON.

Witnesses:

JNO. T. CROSS,

CHAS. K. BENNETT.

Signed by me, the said WILBURN N. DENNISON, at Philadelphia, Pa., this 4th day of September, A. D., 1902.

WILBURN N. DENNISON.

Witnesses:

JNO. T. CROSS,

LEWIS H. VAN DUSEN.

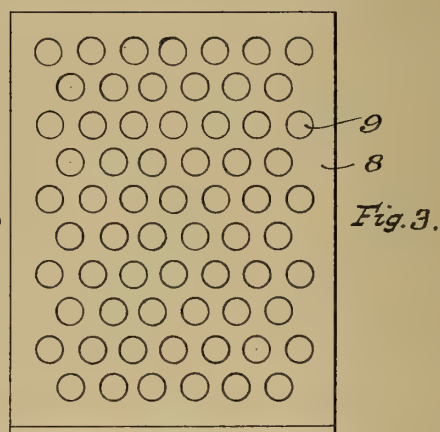
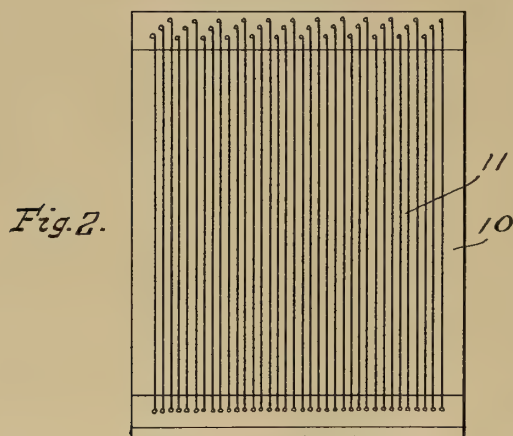
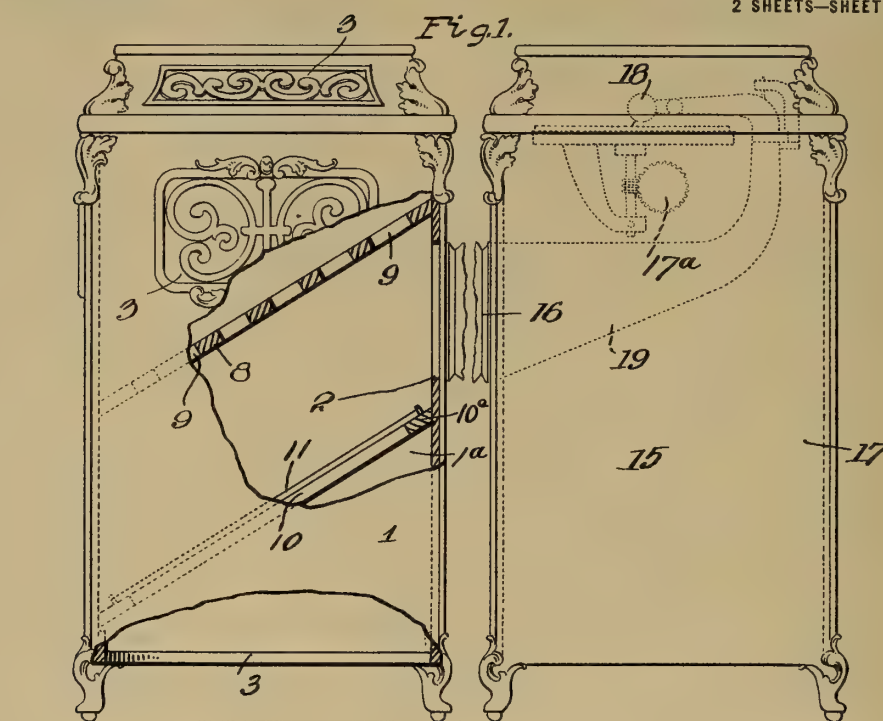
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



CABINET SOUND REPRODUCING MACHINE,  
#1,146,342-----H. C. Miller,  
Patented-July 13, 1915.  
Filed-May 21, 1909.

1,146,342.

2 SHEETS—SHEET 1.



Witnesses,  
Charles Beckwith  
Hoyd Cornwall.

by Jno Muir  
Attorney.



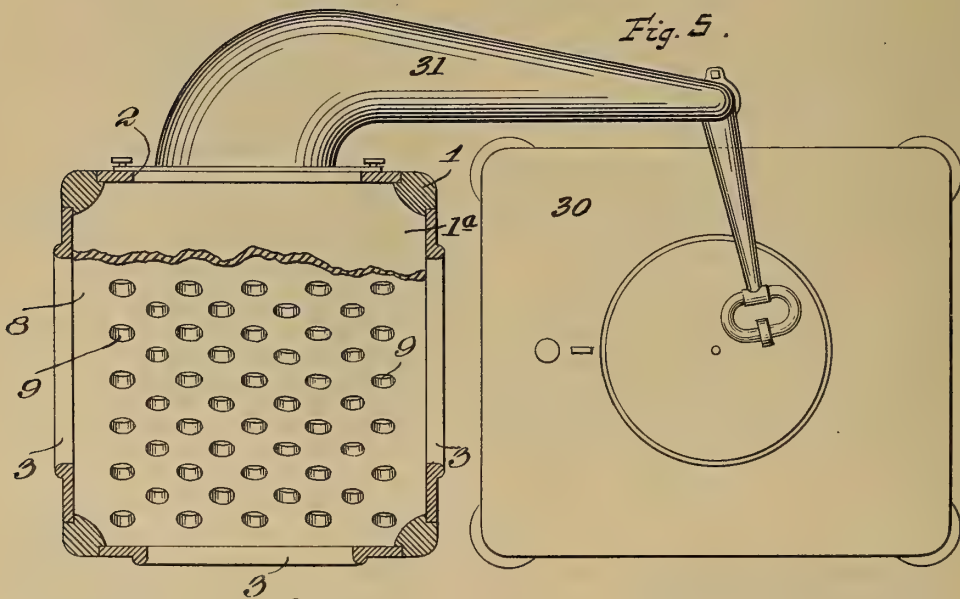
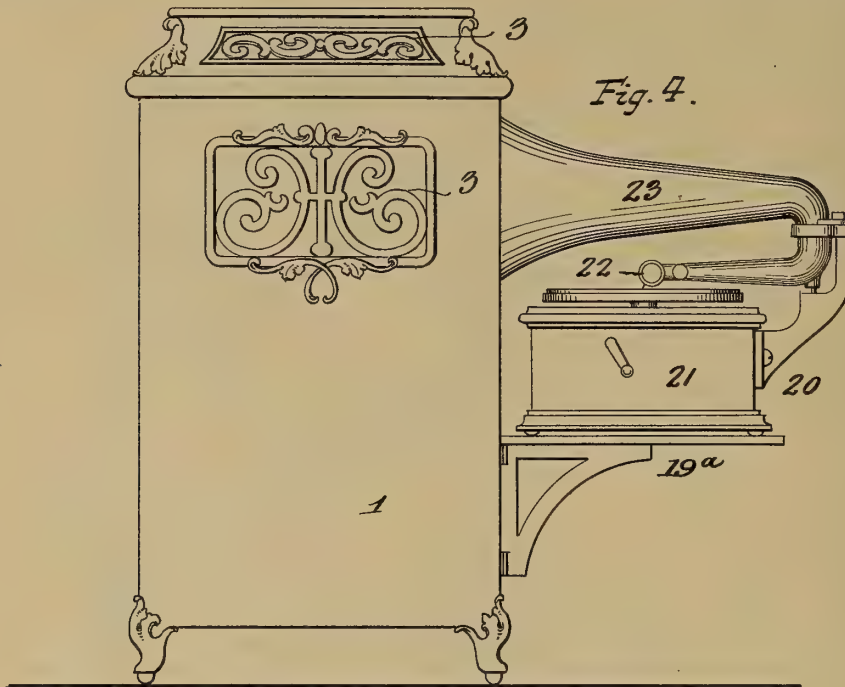


H. C. MILLER.  
CABINET SOUND REPRODUCING MACHINE.  
APPLICATION FILED MAY 21, 1909.

1,146,342.

Patented July 13, 1915.

2 SHEETS—SHEET 2.



Witnesses,  
*Charles L. Searles*  
*Floyd Cornwall*

*Henry C. Miller,*  
Inventor  
by *J. M. Muir*  
Attorney.

# UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## CABINET SOUND-REPRODUCING MACHINE.

1,146,342.

Specification of Letters Patent. Patented July 13, 1915.

Application filed May 21, 1909. Serial No. 497,549.

*To all whom it may concern:*

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Cabinet Sound-Reproducing Machines, of which the following is a specification.

My invention relates to improvements in sound reproducing machines.

One of the objects of this invention is to provide a supplemental cabinet unit having a sound modifying chamber with a sound passage therethrough, said cabinet unit being associated with any of the well known types of talking machines in order to vary the reproduced sound. The unit is so constructed that it may be readily associated with a talking machine or removed therefrom to permit said parts to be employed in conjunction with each other or to enable the talking machine to be used alone, according as desired.

A further object of the invention is to provide a sound chamber having a sound passage therethrough and inclosing a plurality of spaced partition members which subdivide the interior of said chamber and act on the sound waves.

For a full, clear, and exact description of my present invention, reference may be had to the following specification and to the accompanying drawings forming a part thereof, in which:—

Figure 1 is a side elevation of a cabinet unit partly broken away, and a talking machine of the Victrola type associated therewith. Fig. 2 is a plan view of one of the partition members employed in the cabinet unit. Fig. 3 is a similar view of another one of the partition members. Fig. 4 is a view similar to Fig. 1, but illustrating the use of the cabinet unit with a talking machine having an exposed amplifier. Fig. 5 is a plan view of a cabinet unit with still a further style of talking machine, the said unit being shown partially in section.

The numeral 1 indicates a hollow cabinet unit providing a sound chamber 1<sup>a</sup>, and having a passage therethrough for the sound. Arranged within the sound chamber 1<sup>a</sup>, in inclined position, are two spaced substantially parallel partition members 8 and 10, which serve to subdivide the interior of the chamber into separate resonating sub-

compartments as shown. The partition member 8 is provided with a plurality of perforations or openings 9 for the passage of sound, and the partition member 10 comprises a frame 10<sup>a</sup>, across which are stretched strings or wires 11, extending substantially parallel and spaced apart to form sound passages.

In order to provide a sound passage through the chamber 1<sup>a</sup>, the cabinet is formed in a side wall thereof with an inlet opening 2 preferably located at a point between the partition members, and a plurality of outlet openings 3 are provided in the cabinet at points on opposite sides of the partition members from said inlet opening, whereby to cause the sound waves to pass through the entire chamber and be acted upon by said partition members.

Fig. 1 of the drawings illustrates the use of my improved cabinet unit in connection with a talking machine 15 of the Victrola type, and for convenience a flexible or other suitable sound conduit 16 is interposed between said talking machine and the cabinet unit, but it will be apparent that this is not essential. The talking machine shown in Fig. 1 comprises a cabinet 17, a motor 17<sup>a</sup>, a reproducer 18, and a sound tube and amplifier 19, all said parts being of well known construction and specifically forming no part of the present invention.

In the application of the invention shown in Fig. 4, the cabinet unit is provided on one of its side walls with a shelf 19<sup>a</sup>, on which is supported a talking machine 20. This talking machine is of the exposed horn type, and includes a casing 21, a reproducer 22, and an exposed sound conveyor and amplifier 23. The mouth of the amplifier is fitted in, or is in communication with the inlet opening 2, and the talking machine may be adjusted upon the shelf 19<sup>a</sup> for this purpose.

In Fig. 5 a talking machine 30 of the Aux-e-to-phone type has my improved cabinet unit associated therewith, an amplifier 31 being used to convey the sound to the sound chamber 1<sup>a</sup>. The mouth of the amplifier 31 is fitted in or communicates with the opening 2, as shown.

In the operation of any one of the applications of the invention, as above illustrated, the reproduced sound from the talking machine is introduced into the sound cham-



ber of the cabinet unit through the inlet opening 2, and because of the construction and arrangement of the partition members and the location of the outlet openings 3, the reproducing means is in communication with the entire chamber and the sound waves in their passage through the chamber are brought into contact with and acted upon by the partition members.

Obviously, by providing a cabinet unit having the characteristics mentioned, it is possible by placing the amplifier of an ordinary talking machine in communication with the inlet opening 2, to modify the reproduction of any particular selection, without making any alteration or change in the talking machine. If it is desired to use the talking machine without employing the cabinet unit, the operator may readily separate the same, as the two are wholly independent of each other.

It is evident that the term "sound chamber" as herein employed in the specification and claims, comprehends any sound chamber with a sound passage therethrough for modifying or amplifying reproduced sound, and it is to be understood of course that the spaced partitions inclosed within said sound chamber may be of any suitable form or construction within the purview of the appended claims.

What I claim is:—

1. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and outlet for sound, sound reproducing means in communication with said entire chamber, and a plurality of spaced partition members mounted within said sound chamber and subdividing the interior thereof and acting on the sound waves.

2. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and outlet for sound, sound reproducing means located outside of said chamber and in communication with said entire chamber, and a plurality of spaced partition members mounted within said sound chamber and subdividing the interior thereof and acting on the sound waves.

3. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and an outlet for sound, sound reproducing means in communication with said inlet, the sound passing through said entire chamber, and a plurality of spaced partition members within said sound chamber and subdividing the interior thereof.

4. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and an outlet for sound, sound reproducing means in communication with said entire chamber, and a plurality of spaced partition members within and extending entirely between certain walls of

said chamber and subdividing the interior thereof.

5. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and outlet for sound, sound reproducing means in communication with said entire chamber, and a plurality of spaced substantially parallel partition members mounted within said sound chamber and subdividing the interior thereof and acting on the sound waves.

6. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and an outlet for sound, sound reproducing means in communication with said entire chamber, and a plurality of spaced partition members within and extending between opposite walls of said chamber and subdividing the interior thereof and acting on the sound waves.

7. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and outlet for sound, sound reproducing means in communication with said inlet and thereby with said entire chamber, and a partition member within said chamber and subdividing the interior thereof and acting on the sound waves, said partition member being inclined with respect to the longitudinal axis of said chamber.

8. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and an outlet for sound, sound reproducing means in communication with said entire chamber, and a partition member having openings therethrough, said member being mounted within said sound chamber and subdividing the interior thereof and acting on the sound waves.

9. In a talking machine, the combination of a hollow body having a sound chamber with an inlet and outlet for sound, sound reproducing means in communication with said entire chamber, and a partition member within said chamber and subdividing the interior thereof and acting on the sound waves, the said inlet and outlet for sound being located on opposite sides of the plane of said partition member.

10. In combination with a talking machine including sound reproducing means and sound amplifying means communicating therewith, of a supplemental cabinet unit having a sound modifying chamber with a sound passage therethrough, into which said amplifying means discharges the sound, said cabinet unit being independent of said talking machine and separable from said amplifying means, and said talking machine being substantially outside of said cabinet unit.

11. The combination with a talking machine including sound reproducing means and a sound conduit, of a supplemental cabinet unit having a sound modifying chamber



with a sound passage therethrough, into  
which said conduit discharges the sound,  
said supplemental unit being independent  
of said talking machine and separable from  
5 said conduit, and said talking machine be-  
ing substantially outside of said cabinet  
unit.

In testimony whereof I affix my signature  
in presence of two witnesses.

HENRY C. MILLER.

Witnesses:

F. F. FOLLET,

H. S. LUCIER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

THE LIFE OF

JOHN RUSKIN

BY JOHN RUSKIN

METHOD OF MOLDING DUPLICATE SOUND  
RECORDS,

# 1,146,384-----J.W. Aylsworth,  
Patented-July 13, 1915.  
FILED-May 1st, 1909.

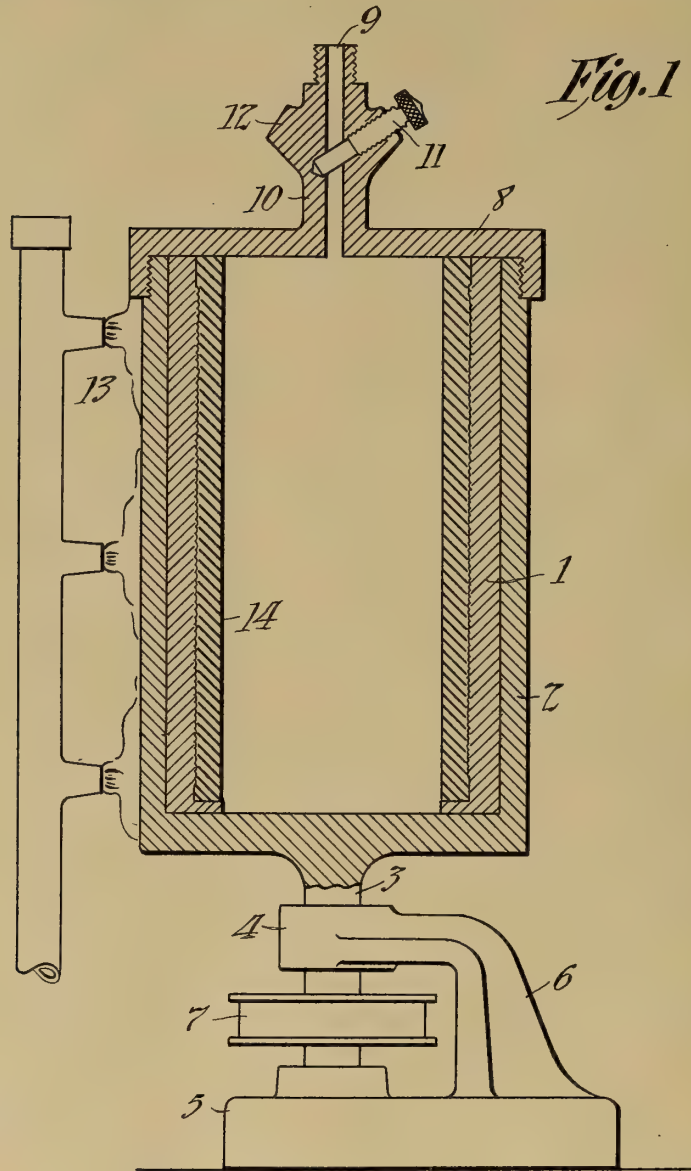


J. W. AYLSWORTH.  
METHOD OF MOLDING DUPLICATE SOUND RECORDS AND OTHER OBJECTS.  
APPLICATION FILED MAY 1, 1909.

1,146,384.

Patented July 13, 1915.

2 SHEETS—SHEET 1.



*Witnesses:*  
Frank D. Lewis  
Dyer Smith

*Inventor:*  
Jonas W. Aylsworth  
by Frank L. Dyer  
*Atty.*



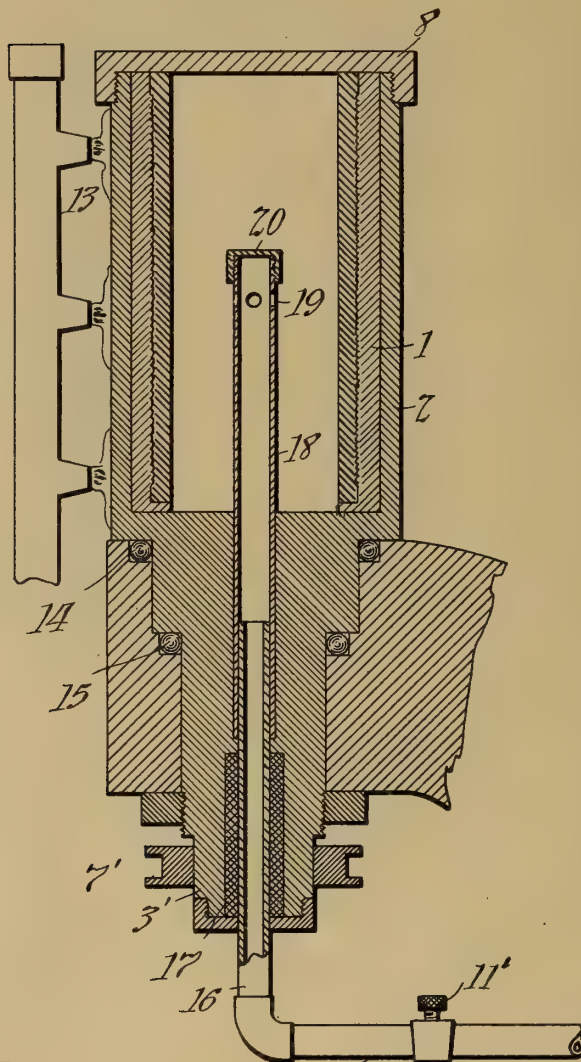
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1,146,384.

Patented July 13, 1915.

2 SHEETS—SHEET 2.

*Fig. 2*



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# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF MOLDING DUPLICATE SOUND-RECORDS AND OTHER OBJECTS.

1,146,384.

Specification of Letters Patent. Patented July 13, 1915.

Application filed May 1, 1909. Serial No. 493,258.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Methods of Molding Duplicate Sound-Records and other Objects, of which the following is a description.

The object of my invention is to provide a method of molding sound records and other objects from substances which are not adapted to be molded by the well known methods.

The invention relates more particularly to a method of molding substances which in their final stage are non-plastic at such temperatures as may be used without injury to the substance or the matrix.

By means of the method herein described, I am enabled to mold sound records, both cylindrical and disk, from such bodies as are produced when albumenoids and caseins are combined with formaldehyde or other aldehydes or equivalent substances, and the various non-plastic condensation products of phenols, their homologues, their polymers and derivatives. These bodies have not heretofore been successfully molded into sound records, but are adapted to form excellent sound records if successfully molded, because of their physical qualities, which are especially useful for the purpose. Heretofore, sound records or other objects could only be molded from such substances by molding the material in the earlier plastic stages of its formation and completing the reaction of formation in the matrix, whereby a more or less porous and bubbly mass resulted, or by molding the substances in a plastic incomplete state and subsequently treating the article with formaldehyde gas or liquid solution to harden the same. In both cases the resulting product was not suitable for sound records because of air or gas bubbles and imperfections of surface which caused foreign noises when the record thus formed was reproduced, and otherwise impaired the quality of the sound record. In the present invention, these defects are eliminated, and a sound record may be produced which is most refractory to the wearing action of the reproducing stylus, and

which is not deteriorated by the effects of heat, moisture, handling and the action of the atmosphere thereon.

The invention may be practised in a number of ways.

Attention is hereby directed to the accompanying drawings, forming part of this specification, and representing apparatus in which my process may be carried out.

Figure 1 is an elevation, partly in section, of a suitable rotatable mold in which a cylindrical sound record may be formed according to the process disclosed in this application, and Fig. 2 is a similar view of modified apparatus adapted to the same purpose.

In carrying out the invention, ingredients such as albumenoids, caseins, gelatins, phenols and their polymers, etc., together with an aldehyde, such as formaldehyde or other substance containing the methylene radical  $\text{CH}_2$ , may be mixed together with a suitable condensing or catalytic agent and allowed to react with the application of heat to form a liquid or plastic mass, which is then introduced into a matrix such as that shown in either of the figures, in which final reaction by which the non-plastic final product is formed is caused to ensue with application of heat while the record is being molded. Or secondly, the body which it is intended to use as the basis of the substance, such as gelatin or casein mass, may be rendered plastic by water and heat and then introduced into the matrix, and formaldehyde or equivalent agent with or without a catalytic or condensing agent may be subsequently introduced, either in liquid or gaseous form into the matrix, and the matrix and its contents heated to hasten the completion of the condensation reaction and the equivalent polymerization or other hardening process, which results in the formation of the final non-plastic product. Or thirdly, a substance in liquid or plastic state may be introduced into the matrix together with a catalytic or other condensing agent, the substance so produced being of such a character that polymerization or equivalent hardening action of the substance to a non-plastic permanent state will be induced in the matrix by heat. As an example of the last mentioned process, a condensation product of phenol with



an aldehyde or other methylene-containing substance may be formed by mixing a phenol, as the well known phenol, carboic acid,  $C_6H_5OH$ , with an aldehyde such as formaldehyde,  $CH_2O$ , in equal molecular proportions and combined by heat and pressure, without the addition, however, of a catalytic or condensing agent. The product thus obtained should, to obtain the best results, be evaporated to remove excess of formaldehyde and water at a temperature not exceeding 280 degrees F., and the product obtained is soluble and plastic or may be rendered plastic by heat, and this is combined with a condensing or catalytic agent, and a small quantity of a polymerized aldehyde or other methylene-containing substance such as paraformaldehyde, both preferably in anhydrous condition, and properly mixed. Such a condensing agent may be either an acid or a basic substance. I prefer, however, to use small quantities of acid radicals or substances which will yield a free acid radical, such as pinene hydrochlorid, sublimed aluminium chlorid, stannic chlorid, etc., because of their rapid action. This condensing agent may be added to the mass at a relatively low temperature as by dissolving the mass in a volatile solvent and then adding the condensing agent and paraformaldehyde, whereupon the product may be poured into the matrix and subjected to subsequent heat treatment while the record is being formed.

In the first and third methods referred to above, a preliminary reaction is caused between the different ingredients before the same are introduced into the mold, the final reaction only taking place in the mold during the formation of the record by the molding process, whereas in the second of the three methods mentioned, the entire reaction between the ingredients takes place in the mold during the formation of the record. In all of these specific methods the final product is formed *in situ* in the mold in which the record or other object cast is formed by a centrifugal action, the process used being that commonly known as spinning.

By the method above outlined, the deleterious effects due to porosity because of the setting or hardening or changing from the plastic to the non-plastic state while the mass is evolving gases, may be prevented by the pressure exerted on the mass by the centrifugal action induced by the relatively high speeds at which the matrix is rotated. Such a process is described and claimed in my application No. 493,416, filed on even date herewith. In the application referred to, the force induced by the centrifugal action alone is depended upon to counteract the tension of dissociation of the mass being molded so that the formation of gas is pre-

vented or retarded and minimized at the temperature necessary to rapidly perform the reaction. In this present application, in addition to the pressure developed by the centrifugal action of the molding process, a further and external pressure is also applied to the mass during the molding operation. This process will be useful where it is necessary to obtain greater pressure than is afforded by the centrifugal force of the rotating mass of material at the speed of rotation which is found desirable, or where it is desirable to increase the temperature and thus hasten the reaction without a further speeding up of the apparatus. This additional pressure may be obtained in either of two ways. It may be obtained by forcing a charge of compressed formaldehyde gas or equivalent agent into the mold, which is then sealed and the reaction carried out. This method is applicable in cases in which the formaldehyde or equivalent agent is introduced in the mold in a gaseous state, as it may be, for example, in the second of the three specific methods described above. Or secondly, in cases in which the formaldehyde or equivalent agent is introduced into the matrix in liquid form or into a liquid or plastic mass in which the formaldehyde or its equivalent has already been incorporated, pressure may be obtained by forcing a charge of compressed air into the mold, or by forcing into the mold a charge of any other compressed gas of such a character that it will not affect the reaction taking place therein. Or again, reaction might be allowed to take place in an uncovered mold placed in the pressure chamber in which pressure of the desired amount to reinforce that furnished by the centrifugal action may be developed.

Referring to the drawings, the mold 1 in Fig. 1 may be inserted within the rotatable container 2, which is integral with or secured to the spindle 3, which is adapted to be rotated within the bearings 4 and 5 of the casting 6. The mold may, of course, be rotated in either a vertical or a horizontal position, but I prefer to use the vertical method of spinning the mold by centrifugal action, because of the high speeds which may readily be secured by this method. The spindle 3 may be rotated by means of the belt wheel 7 secured to the spindle 3, over which a belt driven from any convenient source of power is adapted to be placed, or the spindle 3 may be rotated by an individual drive, as by the direct connection of some prime mover thereto, as is disclosed in application of Aylesworth and Aiken No. 495,301, filed May 11, 1909, upon which U. S. Patent No. 1,041,948 has been granted. After the material has been placed within the mold 1, the cap 8 is screwed or otherwise secured upon the container 2, and the charge of aldehyde



or other compressed gas desired is introduced through passageway 9 formed in the tube 10, the passageway 9 being provided with a valve 11 for closing the same after the charge of gas has been introduced. The tube 10 may be provided with a counter-weighted portion 12, if desirable, to counter-balance the valve 11 during the rotation of the mold. The container, the mold and its contents may be maintained at the desired temperature by any convenient means as by the burner 13. The record 14 is formed on the record surface of the mold 1 after the passageway 9 has been closed by the valve 11 by the centrifugal action induced by the high speed of rotation of the mold. During this operation the final reaction between the ingredients of the composition ensues, changing the same into a non-plastic body which, as in the case of the resinized phenol condensation products, may also be insoluble in all ordinary solvents except boiling concentrated sulfuric acid, and also infusible. Less time is consumed in the molding operation with the use of high temperatures during the final reaction, and also the greater will be the tendency to the evolution of gases, necessitating an increase of pressure to counteract the same as the temperatures are raised to lessen the time factor. Good results are obtained with the use of temperatures above 320 degrees F. in the case of the resinized phenol condensation products.

Referring to Fig. 2 of the drawings, a convenient form of apparatus for carrying out the above described processes are here disclosed. Here the mold 1 is placed within the container 2, which is formed integral with a spindle in the form of a stepped bearing 3', which may be driven by any convenient means as by the belt pulley 7'. The apparatus shown is arranged for a vertical spinning operation, the stepped spindle 3' being supported by any convenient means as the balls 14 and 15. The stepped spindle 3' is formed with a central passageway into which is inserted the end of the stationary pipe 16 by which the charge of compressed gas may be introduced, the supply of the same being regulated as by means of the valve 11'. The stepped spindle 3' is furnished with a stuffing box 17, which may be filled with any suitable packing material surrounding the stationary pipe 16. The pipe 18 is inserted within the central aperture through the stepped spindle 3' from above, in the manner illustrated, to rotate with the spindle 3' around the upper end of the pipe 16 above the stuffing box 17, thus affording a continuous passageway for the gas from the pipe 16 into the mold 1. The pipe 18 may be carried some distance above the bottom of the container 2, and furnished with perforations 19 for the exit of the gas into the mold 1, and with a cap 20 on its

upper end to prevent any of the charge of material placed in the mold falling into the pipe 18.

As stated, excellent results have been obtained in my process with the use of both acid and basic substances as condensing agents. Small percentages of such substances as sodium hydroxid, lithium hydroxid, metallic oxids, and acid radicals may be used successfully.

When gelatins or other albuminoids are used, the substance may be soaked in cold water until it swells, when the excess of water is removed. The swelled gelatin is then heated until it melts and is poured hot into the mold and the aldehyde added. In the case of formaldehyde solution, the proportions of the latter may be varied between five and twenty per cent. of 40% solution of formaldehyde. The temperature of the mold is maintained in the case of such ingredients at about 212 degrees F. during the hardening operation.

During the various reactions of the ingredients in the processes described, water is evolved and the reaction may be hastened in the case of the closed mold by absorbing the water vapors as they are given off. This may be done by connecting the mold with a suitable chamber in which a water absorbing substance is contained. Such substances as quick lime, zinc chlorid, phosphoric anhydrids or anhydrous copper sulfates may be used for this purpose.

In the case of the third specific method of combining the ingredients described above, the condensing agent may be added to a solution containing the initial or intermediate reaction product of the ingredients, which has been formed without the aid of a catalytic agent, or this intermediate product may be placed directly in the mold without the aid of a solution and the condensing agent added to the melted substance in the mold. Where the condensing agent is added to the ingredients dissolved in a volatile solvent as described, I have found good results to accrue from also adding more aldehyde on methylene containing substance to the solution, preferably in the form of para-formaldehyde or other solid aldehyde. I have found excellent results to accrue from the use of hydrochloric acid vapor or gas as a catalytic agent.

The process has so far been described in connection with the molding of cylindrical sound records. It is, however, obvious that it is also applicable to the formation of other symmetrical objects of such materials in which it is desirable that the vaporization of the mass, which would otherwise ensue during the reaction, should be counteracted. Also the method may be used in the formation of disk sound records by the use of a rotating mold such as that described



and claimed in my application No. 493052 filed April 29, 1909, in which the molds for the disk records are secured to the periphery of a symmetrical chamber which is rotated about its axis, forcing the record material which is introduced into the molds into intimate contact with the same by centrifugal force and thus forming the record. Of course, it is obvious also that other objects besides disk sound records might easily be manufactured in the same manner.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold ingredients which react to form substances which in their final stage are non-plastic at such temperatures as may be employed without injury to the substance or mold, subjecting the substance in the mold to gaseous pressure, causing the final reaction between the ingredients to ensue in the mold, and at the same time while maintaining the gaseous pressure revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface and also to counteract the tension of dissociation in the substance during its reaction by centrifugal force, and continuing the operation until the final non-plastic cast is formed, substantially as described.

2. The method of molding sound records and other objects of substances non-plastic in their final condition consisting in heating a revoluble mold containing in fluid condition substances which react on application of heat to form substances which in their final stage are non-plastic at such temperatures as may be employed without injury to the substance or mold, subjecting the substance in the mold to gaseous pressure and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface and also to counteract the tension of dissociation in the substance during its reaction by centrifugal force, and continuing the operation until the final non-plastic cast is formed, substantially as described.

3. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with formaldehyde on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, introducing into the mold and substance a charge of compressed formaldehyde gas, sealing the mold, applying heat sufficient to cause the entire reaction to ensue in the mold and at

the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and continuing the operation until the final non-plastic cast is formed, substantially as described.

4. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with formaldehyde on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, subjecting the substance in the mold to formaldehyde gas under pressure, applying heat sufficient to cause reaction between the substance in the mold and the formaldehyde gas to ensue in the mold and at the same time while maintaining the gaseous pressure revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and continuing the operation until the final non-plastic cast is formed, substantially as described.

5. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with an aldehyde on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, introducing into the mold and substance a charge of an aldehyde gas under pressure, sealing the mold, applying heat sufficient to cause the entire reaction to ensue in the mold and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and continuing the operation until the final non-plastic cast is formed, substantially as described.

6. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with a substance containing the methylene radical on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, introducing into the mold and substance a charge of compressed gas of a substance containing the methylene radical, sealing the mold, applying heat sufficient to cause the entire reaction to ensue in the mold and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and continuing the operation until the final non-plastic cast is formed, substantially as described.

7. The method of molding sound records and other objects of substances non-plastic

in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with an aldehyde on application of heat to form a substance 5 which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, subjecting the substance in the mold to an aldehyde gas under pressure, applying heat sufficient 10 to cause reaction between the substance in the mold and the aldehyde gas to ensue in the mold, and at the same time while maintaining the gaseous pressure revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, 15 and continuing the operation until the final non-plastic cast is formed, substantially as described.

8. The method of molding sound records 20 and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold ingredients which harden by chemical action on application of sufficient heat to form a substance which in its final stage is non-plastic, 25 subjecting the ingredients in the mold to gaseous pressure and heat sufficient to cause the final reaction and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the 30 mold surface and also to counteract the tension of dissociation in the substance during its reaction by centrifugal force, and continuing the operation until the final non-plastic cast is formed, substantially as described. 35

9. The method of molding sound records

and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with an aldehyde on 40 application of heat to form a substance which in its final stage is non-plastic, subjecting the mass in the mold, with which is incorporated a condensing agent, to a charge 45 of an aldehyde gas under pressure and to heat sufficient to cause reaction between the mass in the mold and the aldehyde gas and at the same time revolving the mold at a high rate of speed to spread the substance 50 uniformly over the mold surface, and continuing the operation until the final non-plastic cast is formed, substantially as described.

10. The method of molding sound records 55 and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a phenol and a condensing agent and subjecting 60 the mass in the mold to a charge of an aldehyde gas under pressure and to heat sufficient to cause the final reaction and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and continuing 65 the operation until the final non-plastic cast is formed, substantially as described.

This specification signed and witnessed this 28th day of April, 1909.

JONAS W. AYLSWORTH.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



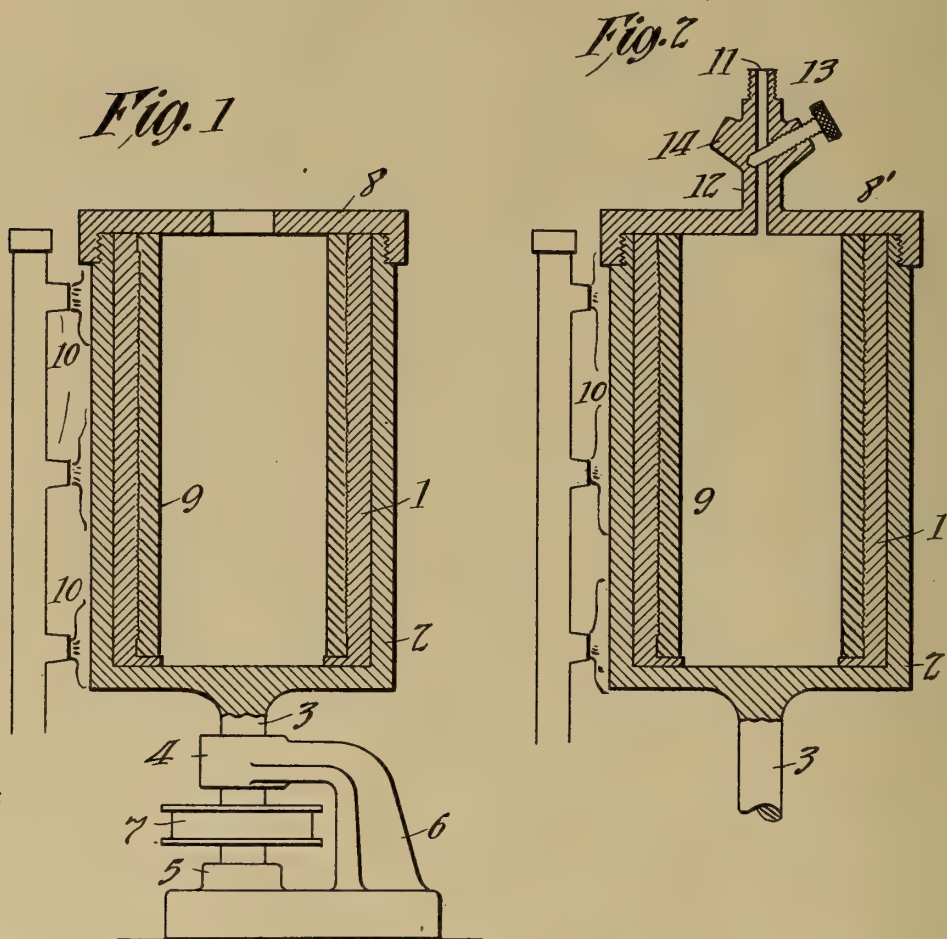


METHOD OF MOLDING DUPLICATE SOUND RECORDS,  
# 1,146,385-----J.W.Aylsworth,  
Patented-July 13, 1915.  
Filed-May 1st, 1909.

J. W. AYLSWORTH.  
METHOD OF MOLDING DUPLICATE SOUND RECORDS AND OTHER OBJECTS.  
APPLICATION FILED MAY 1, 1909.

1,146,385.

Patented July 13, 1915.



*Witnesses:*  
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Dyer Smith

*Inventor:*  
Jonas W. Aylsworth  
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Atty.

# UNITED STATES PATENT OFFICE.

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METHOD OF MOLDING DUPLICATE SOUND-RECORDS AND OTHER OBJECTS.

1,146,385.

Specification of Letters Patent. Patented July 13, 1915.

Application filed May 1, 1909. Serial No. 493,416.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States and a resident of East Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Methods of Molding Duplicate Sound-Records and other Objects, of which the following is a description.

The object of my invention is to provide a method of molding sound records and other objects from substances which are not adapted to be molded by the well known methods.

The invention relates more particularly to a method of molding substances which in their final stage are non-plastic at such temperatures as may be used without injury to the substance or the matrix.

By means of the method herein described, I am enabled to mold sound records, both cylindrical and disk, from such bodies as are produced when albumenoids and caseins are combined with formaldehyde or other aldehydes or equivalent substances, and the various non-plastic condensation products of phenols, their homologues, their polymers and derivatives. These bodies have not heretofore been successfully molded into sound records, but are adapted to form excellent sound records if successfully molded, because of their physical qualities, which are especially useful for the purpose. Heretofore, sound records or other objects could only be molded from such substances by molding the material in the earlier plastic stages of its formation and completing the reaction of formation in the matrix, whereby a more or less porous and bubbly mass resulted, or by molding the substances in a plastic incomplete state and subsequently treating the article with formaldehyd gas or liquid solution to harden the same. In both cases, the resulting product was not suitable for sound records because of air or gas bubbles and imperfections of surface which caused foreign noises when the record thus formed was reproduced, and otherwise impaired the quality of the sound record. In the present invention these defects are eliminated, and a sound record may be produced which is most refractory to the wearing action of the reproducing stylus, and which is not deteriorated by the effects of heat, moisture, han-

dling and the action of the atmosphere thereon.

The invention may be practised in a number of ways. Attention is hereby directed to the accompanying drawings, forming part of this specification, and representing apparatus in which my process may be carried out.

Figure 1 is an elevation, partly in section, of a suitable rotatable mold in which a cylindrical sound record may be formed in the case in which the formaldehyde or equivalent agent is used in the liquid solution, and Fig. 2 is a similar view of apparatus adapted to the use of the formaldehyde or equivalent agent in the form of gas.

In carrying out the invention the ingredients such as albumenoids, caseins, gelatins, phenols and their polymers, etc., together with an aldehyde, such as formaldehyde or equivalent agent containing the methylene radical  $\text{CH}_2$ , may be mixed together with a suitable condensing or catalytic agent and allowed to react with the application of heat to form a liquid or plastic mass, which is then introduced into a matrix such as that shown in Fig. 1, in which the final reaction by which the non-plastic final product is formed, is caused to ensue, with application of heat, while the record is being molded. Or secondly, the body which it is intended to use as the basis of the substance, such as gelatin or casein mass, may be rendered plastic by water and heat, and then introduced into the matrix, or a body which is already plastic, as phenol, may be used, and the formaldehyde or equivalent agent with or without a catalytic or condensing agent may be subsequently introduced, either in fluid, that is, liquid or gaseous, form, into the matrix, and the matrix and its contents heated to hasten the completion of the condensation reaction and the equivalent polymerization or other hardening process, which results in the formation of the final non-plastic product. Or thirdly, a substance in liquid or plastic state may be introduced into the matrix together with a catalytic or other condensing agent, the substance so introduced being of such a character that polymerization or equivalent hardening action of the substance to a non-plastic permanent state will be induced in



the matrix by heat. As an example of the last mentioned process, a condensation product of phenol with an aldehyde or other methylene-containing substance may be formed by mixing a phenol, as the well known phenol, carbolic acid,  $C_6H_5OH$ , with an aldehyde, as formaldehyde,  $CH_2O$ , in equal molecular proportions and combined by heat and pressure, without the addition, however, of a catalytic or condensing agent. The product thus obtained should, to obtain the best results, be evaporated to remove excess of formaldehyde and water at a temperature not exceeding 280 degrees F., and the product obtained is soluble and plastic or may be rendered plastic by heat, and this is combined with a condensing or catalytic agent and a small quantity of polymerized aldehyde or other methylene-containing substance, such as paraform aldehyde, both preferably in anhydrous condition, and properly mixed. Such a condensing agent may be either an acid or a basic substance. I prefer, however, to use small quantities of acid radicals or substances which will readily yield a free acid radical, such as pinene hydrochlorid, sublimed aluminium chlorid, stannic chlorid, etc, because of their rapid action. This condensing agent may be added to the mass at a relatively low temperature as by dissolving the mass in a volatile solvent in cases where the mass does not fuse at low enough temperature, and then adding the condensing agent and paraform aldehyde, whereupon the product may be poured into the matrix and subjected to subsequent heat treatment while the record is being formed.

In the first and third methods referred to above, a preliminary reaction is caused between the different ingredients before the same are introduced into the mold, the final reaction only taking place in the mold during the formation of the record by the molding process, whereas in the second of the three methods mentioned, the entire reaction between the ingredients takes place in the mold during the formation of the record. In all of these specific methods the final product is formed *in situ* in the mold in which the record or other object cast is formed by a centrifugal action, the process used being that commonly known as spinning. By this method the deleterious effects due to porosity because of the setting or hardening or changing from the plastic to the non-plastic state while the mass is evolving gases, is prevented by the pressure exerted on the mass by the centrifugal action induced by the relatively high speeds at which the matrix is rotated. The force induced by this centrifugal action counteracts the tension of dissociation in the mass being molded so that the formation of gas is prevented or retarded and minimized at the

temperature necessary to rapidly perform the reaction.

Referring to the drawings, the mold 1 may be inserted within the rotatable container 2, which is integral with or secured to the spindle 3, which is adapted to rotate within the bearings 4 and 5 of the casting 6. The mold may, of course, be rotated in either a vertical or a horizontal position, but I prefer to use the vertical method of spinning the mold by centrifugal action, because of the high speeds which may readily be secured by this method. The spindle 3 may be rotated by means of the belt wheel 7 secured to the spindle 3, over which a belt driven from any convenient source of power is adapted to be placed, or the spindle 3 may be rotated by an individual drive, as by the direct connection of some prime mover thereto, as is disclosed in application of Aylsworth and Aiken No. 495,301, filed May 11, 1909, upon which Patent No. 1,041,948 has been granted. In the case in which the formaldehyde or other aldehyde or methylene-containing substance employed is introduced in a liquid solution, the apparatus shown in Fig. 1 may be used. Here, the material of an amount sufficient to form the record is introduced within the mold 1 and the cap 8 secured upon the container 2. The record 9 is then formed upon the bore of the mold 1 by centrifugal action, the spindle 3 being rotated at a high speed. During the formation of the record, the container 2, the mold 1 and the record 9 in process of forming, are kept heated by any convenient means, as the burners 10. During this operation the final reaction between the ingredients of the composition ensues, changing the same into a non-plastic body, which, as in the case of the resinized phenol condensation products, may also be insoluble in all ordinary solvents except boiling concentrated sulphuric acid, and also infusible. Less time is consumed in the molding operation with the use of high temperatures during the final reaction, and also the greater will be the tendency to the evolution of gases, necessitating an increase of pressure to counteract the same as the temperatures are raised to lessen the time factor. Good results are obtained with the use of temperatures above 320 degrees F. in the case of the resinized phenol condensation products.

When the formaldehyde or equivalent agent is introduced into the matrix in the form of gas, it is necessary that the matrix be closed after the introduction of the same. This may be carried out by means such as that shown in Fig. 2, in which the cap 8' is formed with a passageway 11 for the gas in the boss 12, and with a valve 13 for closing the same. The boss 12 may be formed with a counterweighted portion 14 to counter-



balance the valve 13 during the rotation of the same.

As stated, excellent results have been obtained in my process with the use of both acid and basic substances as condensing agents. Small percentages of such substances as sodium hydroxid, lithium hydroxid, metallic oxids, and acid radicals may be used successfully.

When gelatins or other albumenoids are used, the substance may be soaked in cold water until it swells, when the excess of water is removed. The swelled gelatin is then heated until it melts and is poured hot into the mold and the aldehyde or methylene-containing substance added. In the case of formaldehyde solution, the proportions of the latter may be varied between five and twenty per cent. of 40% solution of formaldehyde. The temperature of the mold is maintained in the case of such ingredients at about 212 degrees F. during the hardening operation.

During the various reactions of the ingredients in the processes described, water is evolved and the reaction may be hastened in the case of the closed mold by absorbing the water vapors as they are given off. This may be done by connecting the mold with a suitable chamber in which a water absorbing substance is contained. Such substances as quick lime, zinc chlorid, phosphoric anhydrids or anhydrous copper sulfates may be used for this purpose.

In the case of the third specific method of combining the ingredients described above, the condensing agent may be added to a solution containing the initial or intermediate reaction product of the ingredients, which has been formed without the aid of a catalytic agent, or this intermediate product may be placed directly in the mold without the aid of a solution and the condensing agent added to the melted substance in the mold. Where the condensing agent is added to the ingredients dissolved in a volatile solvent as described, I have found good results to accrue from also adding more aldehyde to the solution, preferably in the form of paraform aldehyde or other solid aldehyde. I have found excellent results to accrue from the use of hydrochloric acid vapor or gas as a catalytic agent.

The present invention relates specifically to the novel method of producing pressure by which the dissociation gases which tend to be formed during the reaction are counteracted. The pressure caused by the centrifugal force due to the rotation of the mold, may, if desired, be augmented by the use of further pressure, and such a method I have claimed in an application filed on even date herewith, Serial No. 493,258.

The process has so far been described in connection with the molding of cylindrical

sound records. It is, however, obvious that it is also applicable to the formation of other symmetrical objects of such materials in which it is desirable that the vaporization of the mass which would otherwise ensue during the reaction should be counteracted. Also, the method may be used in the formation of disk sound records by the use of a rotating mold such as that described and claimed in my application No. 493,052, filed April 29, 1909, in which the molds for the disk records are secured to the sides of an eight-sided or other poly-sided chamber, which is rotated about its axis, throwing the liquid or plastic material into the various molds, the material being measured and only sufficient quantity used in the process. Of course, it is also obvious that other objects besides disk sound records might easily be manufactured in the same manner.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in heating in a revoluble mold a fluid mass comprising a methylene containing substance and a substance which reacts with said methylene containing substance upon application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, and at the same time revolving the mold at a high rate of speed to spread the mass uniformly over the mold surface and also to counteract the tension of dissociation in the mass during its reaction, and continuing the operation until the final non-plastic cast is formed, substantially as described.

2. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with formaldehyde on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, and a sufficient amount of fluid formaldehyde to cause the reaction, applying heat, causing the final reaction between the ingredients to ensue in the mold, and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and also to counteract the tension of dissociation in the substance during its reaction, and continuing the operation until the final non-plastic cast is formed, substantially as described.

3. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in introducing into a suitable rotatable mold a substance which reacts with a substance con-



taining the methylene radical upon application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, and a sufficient amount of fluid methylene-containing substance to cause the reaction, applying heat, causing the final reaction between the ingredients to ensue in the mold and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface and also to counteract the tension of dissociation in the substance during its reaction, and continuing the operation until the final non-plastic cast is formed, substantially as described.

4. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in rendering plastic and introducing within a suitable rotatable mold a substance which reacts with an aldehyde on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, introducing into the mold and substance a sufficient amount of a fluid aldehyde to cause the reaction, applying heat sufficient to cause the entire reaction to ensue in the mold and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and also to counteract the tension of dissociation in the substance during its reaction by centrifugal force, and continuing the operation until the final non-plastic cast is formed, substantially as described.

5. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in rendering plastic and introducing within a suitable rotatable mold a substance which reacts with a methylene-containing substance on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, introducing into the mold and substance a sufficient amount of a fluid methylene-containing substance to cause the reaction, applying heat sufficient to cause the entire reaction to ensue in the

mold and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface and also to counteract the tension of dissociation in the substance during its reaction by centrifugal force, and continuing the operation until the final non-plastic cast is formed, substantially as described.

6. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in rendering plastic and introducing within a suitable rotatable mold a substance which reacts with an aldehyde on application of heat to form a substance which in its final stage is non-plastic at such temperatures as may be employed without injury to the substance or mold, introducing into the mold and substance a sufficient amount of a fluid aldehyde and a condensing agent to cause the reaction, applying heat sufficient to cause the entire reaction to ensue in the mold and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and also to counteract the tension of dissociation in the substance during its reaction by centrifugal force, and continuing the operation until the final non-plastic cast is formed, substantially as described.

7. The method of molding sound records and other objects of substances non-plastic in their final condition, consisting in applying heat to a phenol, formaldehyde, and a condensing agent in a suitable rotatable mold sufficient to cause a reaction to transform the substances into a hard non-plastic substance and at the same time revolving the mold at a high rate of speed to spread the substance uniformly over the mold surface, and also to counteract the tension of dissociation in the substance during its reaction by centrifugal force, and continuing the operation until the final non-plastic cast is formed, substantially as described.

This specification signed and witnessed this 28th day of April 1909.

JONAS W. AYLSWORTH.

Witnesses:

DYER SMITH,  
JOHN M. CANFIELD.



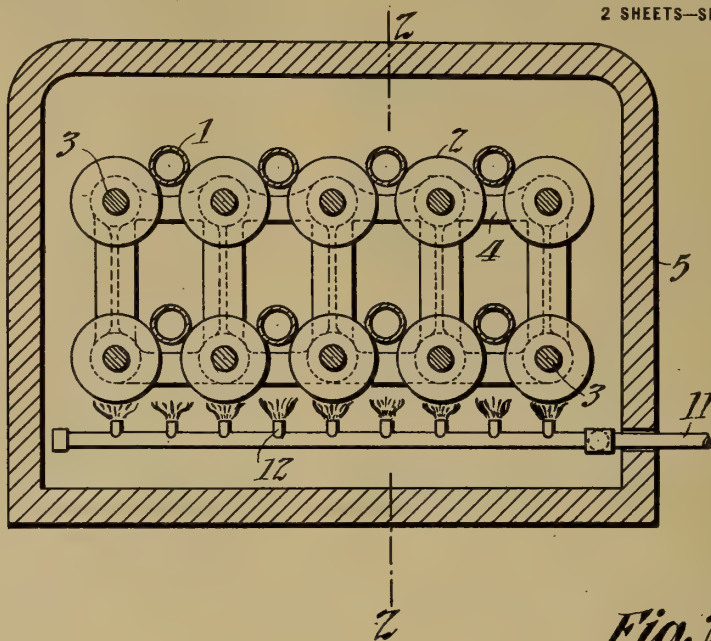
PROCESS FOR MAKING PHONOGRAPH RECORDS,  
# 1,146,386-----J.W.Aylsworth,  
Patented-July 13, 1915.  
Filed-May 29, 1909.

J. W. AYLSWORTH.  
 PROCESS FOR MAKING PHONOGRAPH RECORDS.  
 APPLICATION FILED MAY 29, 1909.

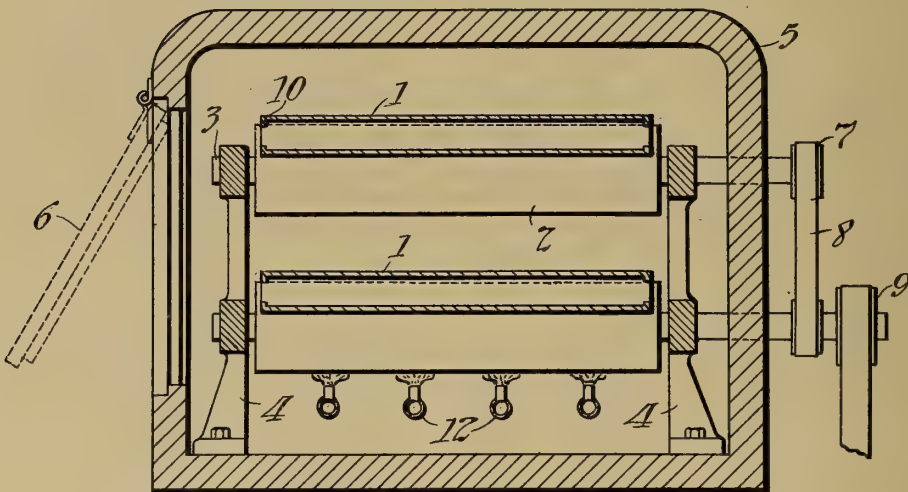
1,146,386.

Patented July 13, 1915.  
 2 SHEETS—SHEET 1.

*Fig. 1*



*Fig. 2*



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*Inventor:*  
 Jonas W. Aylsworth  
 by Frank L. Dyer  
 Atty.



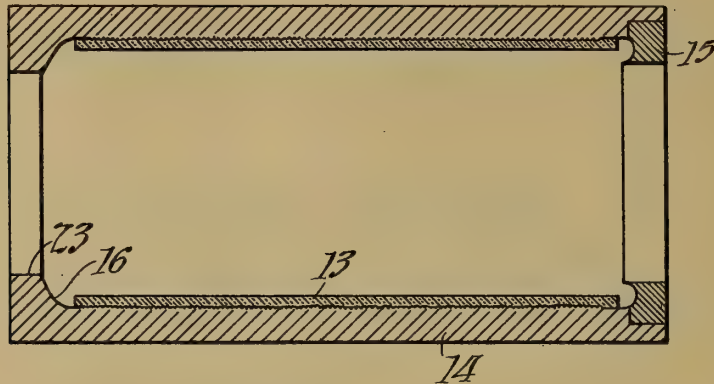


J. W. AYLSWORTH.  
PROCESS FOR MAKING PHONOGRAPH RECORDS.  
APPLICATION FILED MAY 29, 1909.

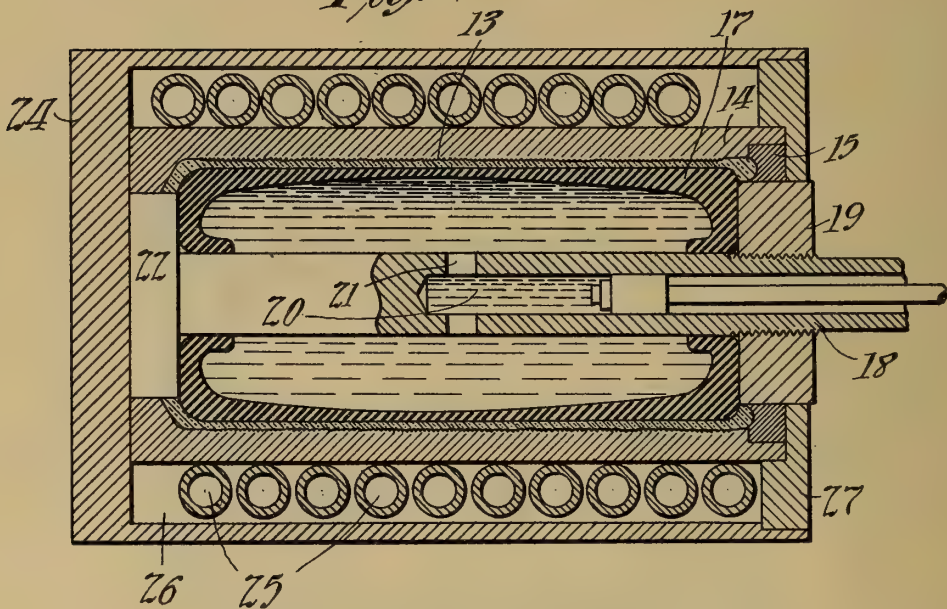
1,146,386.

Patented July 13, 1915.  
2 SHEETS—SHEET 2.

*Fig. 3*



*Fig. 4*



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by Frank L. Aylsworth  
Att'y.

# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS FOR MAKING PHONOGRAPH-RECORDS.

1,146,386.

Specification of Letters Patent.

Patented July 13, 1915.

Application filed May 29, 1909. Serial No. 499,103.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Processes for Making Phonograph-Records, of which the following is a description.

My invention relates to the art of molding phonograph records and my object is to provide a very hard and enduring phonograph record which has in addition other advantageous qualities.

My invention also has for its object a process for producing such a record and an improved apparatus in which said process may be carried out.

My invention also comprises a process and means for forming in a novel manner a phonograph record having inwardly directed flanges or ends forming taper bearing surfaces, by which the cylindrical record may be seated upon a taper mandrel.

Other objects reside in the elements, combinations of parts, processes and sub-processes as hereinafter described.

The process features of my invention alone are claimed in this application. The article disclosed herein is claimed in my copending application Serial No. 30,197, filed May 24, 1915, which, as to certain features, is a division of this application.

In phonographic records both cylindrical and disk, particularly those in which more than 100 record threads per inch are provided, it is advantageous that the record composition should be as enduring as possible as to the wearing action of the stylus on the record, while at the same time the record should not act as an abrasive agent on the stylus. In addition to the qualities mentioned, and the other qualities which it is well known a phonograph record should have, the same should be capable of economical manufacture.

The compositions comprising final condensation products of phenols and formaldehydes combined with a final product solvent element, and with or without the addition of a water combining element, which are described in my application Serial No. 496,060, filed May 14, 1909, and upon which U. S. Patent No. 1,102,630 has been granted, form materials admirably suited for the formation of such sound records into which they may conveniently be molded by the method

hereinafter described. The substances referred to are insoluble in common solvents, infusible at any temperature below that of their decomposition, and are normally non-plastic, but become sufficiently plastic for further working as by pressing in a mold on application of heat sufficient to produce a temperature of from 240 to 300 degrees F.

In the practice of my invention, tubes of the above mentioned composition are first formed in their final hardened condition, and these tubes or suitable lengths of the same are subsequently pressed in a heated matrix into intimate contact with the record surface of the mold.

Attention is hereby directed to the accompanying drawings, forming a part of this specification, and illustrating one form of apparatus in which my improved process may be carried out.

In these drawings Figure 1 represents a vertical cross section of apparatus for forming the tubes, parts of the apparatus being shown in elevation; Fig. 2 is a cross section on line 2—2 of Fig. 1; Fig. 3 is a vertical cross section of a mold having a tube or record blank inserted therein, and Fig. 4 is a vertical cross section of apparatus for forming in the mold a cylindrical record having tapered bearing surfaces.

Referring to the drawings, the tubes or record blanks are first formed by mixing the ingredients which react upon heating to form the final hardened composition together with the final product solvent element and, if desired, a water combining element, pouring the mixture while in a molten plastic condition in smooth bore metal tubes and rotating the same at sufficient speed to cause the mass to become uniformly distributed within the bore of the tubes, while at the same time heat is applied thereto during the rotation of the tubes sufficient to cause the hardening of the tubes so formed, by causing the blanks to pass from the molten plastic to the infusible condition. A large number of tubes containing the above described record composition may be mounted on wheel bearings, or in any other convenient manner to produce rotation thereof, in an oven in which the tubes and the contents thereof are at the same time heated by steam or dry heat.

Referring to Figs. 1 and 2 of the drawings, the tubes 1 which are the matrices for the record blanks, are supported on rollers 2



which are mounted on horizontal shafts 3 supported by the frame member 4 within the oven 5 which is provided with door 6. The shafts or spindles 3 may be extended through the wall of the oven, and provided with pulleys 7 which are connected by a belt or belts as 8, one of the shafts 3 being provided with a pulley 9 which is driven from any convenient source. It is, of course, obvious that the various shafts 3 may be connected by gearing or any other suitable means for obtaining uniform rotation of the same. The hollow tubes 1 should be provided with inwardly projecting annular shoulders 10 at the ends thereof to prevent the flowing of the molten composition out of the ends. As stated, the tubes are heated during their rotation and the consequent formation of the cylindrical blanks in any suitable manner to cause the reaction to ensue by which the final hardened product is formed. I have illustrated in the drawings the pipe 11 introduced into the oven and provided with burners 12 by which this heating is accomplished. The tubes 1 should be rotated at sufficient speed to provide a centrifugal force sufficient to counteract the evolution of dissociation gases in the molten material. On the completion of the reaction and formation of the record blanks, the matrices and contents are cooled below the temperature at which the blanks are plastic, and subsequently the blanks may be cooled further to shrink the same away from the tube matrices in order to withdraw the blanks therefrom, or the blanks may be withdrawn from the oven in any other convenient manner. The blanks forming the tubes 1 may be of the proper length for forming phonograph records therefrom, or if desired, they may be made very much longer than the phonograph records which they are desired to form, and subsequently cut into suitable lengths for pressing in the matrix to form the desired records.

To form a phonograph record by my improved process, a record blank as 13 is inserted within a suitable mold as 14, which is preferably provided with an annular end piece 15 at one end thereof and with a curved inwardly projecting surface 16 at the other end. The container 17 of rubber or other suitable elastic material is placed within the blank 13 and the fluid pressure connection 18 placed within the container 17. The cylindrical member 19 is screwed on the pipe or pressure connection 18 to fit within the ring 15 of the mold 14 and adjusted so that the inner face of the cylinder 19 projects a short distance inwardly from the inner face of the ring 15. The pressure connection 18 is provided with means for introducing a fluid under pressure 20 into the interior thereof and with radial openings 21 by which the same may be allowed to pass

from the pipe 18 into the container 17. The pressure connection 18 is provided at its forward end with a cylindrical portion of enlarged diameter, which is adapted, when the device is assembled, to fit snugly within shoulder 23 caused by the inward projection of surfaces 16 of the mold 14. The parts are so adjusted that the inner surface of cylindrical member 22 extends somewhat inwardly beyond the inner edge of the shoulder 23. The parts assembled as described are placed within a suitable oven 24, which may be provided with any suitable means for heating and cooling the same, as the coiled pipes 25 in the annular chamber 26. The oven may be closed by the end member or ring 27 which is mounted to fit around the ring 19 and the mold 14 and to fit within the cylindrical walls of the oven 24.

The container 17 is preferably formed as indicated in such a manner that on the application of pressure within the same, it will expand at the center, and thereafter, on application of more pressure, expand progressively from the center in both directions toward each end as far diametrically as the matrix will allow. This result may be achieved by making the container 17 of rubber or other suitable elastic material, thinnest at a section midway between the ends and progressively uniformly in thickness from such section toward the two ends.

When the matrix, record blank and parts, as above described, have been inserted within the oven, the same is heated to such a point that the record blank becomes sufficiently plastic to be expanded or pressed into intimate contact with the record surface of the matrix. A suitable fluid is then admitted through pipe 18 into the interior of the container. Any fluid suitable for the purpose may be used, such a fluid being, for example, castor oil. On application of this pressure, the container 17 bulges outward, first at its least resisting point which is in the center. On application of more pressure the container 17 expands progressively in both directions from the center whereby the material in the plastic tube 13 is caused to flow from the center toward each end in addition to the movement of the outer surface of the record blank into intimate contact with the record grooves of the matrix. As the plastic material is forced axially it drives the air contained between the container 17 and the mold 14 axially ahead of it and out at each end where it escapes between the surface 22 and the shoulder 23 at one end, and the member 27 and rings 15 and 19 at the other end, these joints not being air-tight. The plastic material is drawn or forced along the curved surface 16 at one end of the record until it abuts the cylindrical surface 22, and along the curved surface of the inner face of ring 15 until it



abuts the cylindrical surface of the ring 19. By this means bearing flanges or rings are formed at the ends of the record cylinder, these flanges or rings having surfaces formed by the cylinders 22 and 19 by which the record may be supported on a taper mandrel, the diameters of cylinders 19 and 22 being chosen to produce the desired taper. After the conclusion of the pressing operation, the steam in the steam jacket may be replaced by cold water and after a few seconds the record 13 will then cool sufficiently to be no longer plastic, when the pressure within the pipe 18 may be relieved and the pressure connection withdrawn. The mold may then be further cooled to cause the record to contract sufficiently to be extracted therefrom, or the record may be extracted from the mold in any other desired manner. The record when extracted is entirely finished except for the detail of filling in the pigment on the label of the same.

It should be noted that the process and apparatus described for forming a record having tapered bearing surfaces from a cylindrical blank may be practised in connection with the formation of records from other plastic materials than those specifically described. It is also obvious that disk sound records may be formed of the phenol condensation product above referred to and invented by me, by forming suitable blanks of the infusible final condensation product, rendering the same plastic by application of sufficient heat, and pressing into intimate contact with the record surface of a suitable mold.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. The process of manufacturing phonograph records which comprises causing the material of the inner portion of a cylindrical blank of suitable material in plastic condition to flow from a line intermediate the ends toward the ends of the blank while pressing the latter into contact with the mold surface of a suitable mold, substantially as described.

2. The process of manufacturing phonograph records which comprises causing the material of the inner portion of a cylindrical blank to flow longitudinally of the blank toward the ends thereof while pressing the latter into contact with the mold surface of a suitable mold, substantially as described.

3. The process of manufacturing phonograph records, consisting in pressing a cylindrical blank of suitable material in plastic condition into contact with the record surface of a suitable mold by applying pressure first to the bore of the blank in a section between the two ends, to expand the blank into contact with the mold, and while

maintaining such pressure, to progressively apply pressure to the bore of the blank over every section thereof from the first mentioned section to the two ends and maintaining the same, whereby some of the material of the blank is caused to flow from the first mentioned section toward the two ends, substantially as described.

4. The process of manufacturing phonograph records, consisting in pressing a cylindrical blank of suitable material in plastic condition into contact with the record surface of a suitable mold by applying pressure first to the bore of the blank in a section between the two ends, to expand the blank into contact with the mold, and while maintaining such pressure, to progressively apply pressure to the bore of the blank over every section thereof from the first mentioned section to the two ends and maintaining the same, whereby some of the material of the blank is caused to flow from the first mentioned section toward the two ends, and form inwardly projecting bearing surfaces at such ends, rendering the record non-plastic and withdrawing the same from the mold, substantially as described.

5. The process of manufacturing phonograph records or blanks consisting in rendering a cylinder of suitable material plastic within a suitable mold, forcing a part of the material of the bore of the cylinder while plastic to flow inwardly toward the axis of the cylinder to form inwardly directed flanges adapted to support the cylinder upon a phonograph mandrel, substantially the whole of said flanges being formed by said flow, causing the cylinder to harden, and removing it from the mold, substantially as described.

6. The process of manufacturing phonograph records or blanks consisting in pressing a blank cylinder of suitable material in plastic condition against the mold surface of a suitable mold and causing some of the plastic material of the cylinder to flow longitudinally of the cylinder toward the ends thereof and then to flow inwardly toward the axis of the cylinder to form at the ends of the cylinder bearing flanges adapted to support the cylinder upon a phonograph mandrel, substantially as described.

7. The process of forming sound records which comprises heating to reaction temperature in a rotating mold a composition containing ingredients which react on application of sufficient heat to form a final hardened phenolic condensation product, said composition containing also a final product solvent, substantially as described.

8. The process of forming sound records which comprises heating to a reaction temperature in a rotating mold a composition containing ingredients which react on application of sufficient heat to form a final

hardened phenolic condensation product, said composition containing also a final product solvent, removing the blank thus formed from the mold, rendering the same  
5 plastic by application of heat, and pressing a sound record thereon, substantially as described.

10 9. The process of manufacturing sound records which comprises causing a cylindrical blank upon the outer surface of which the record is to be formed to first intimately contact a mold at a point intermediate its ends and then progressively toward its ends, substantially as described.

10. The process of manufacturing sound records which comprises causing a cylindrical blank upon the outer surface of which the record is to be formed to first intimately contact a mold at a point substantially midway between its ends and then progressively  
20 toward its ends, substantially as described.

This specification signed and witnessed this 28th day of May 1909.

JONAS W. AYLSWORTH.

Witnesses:

DYER SMITH,  
JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

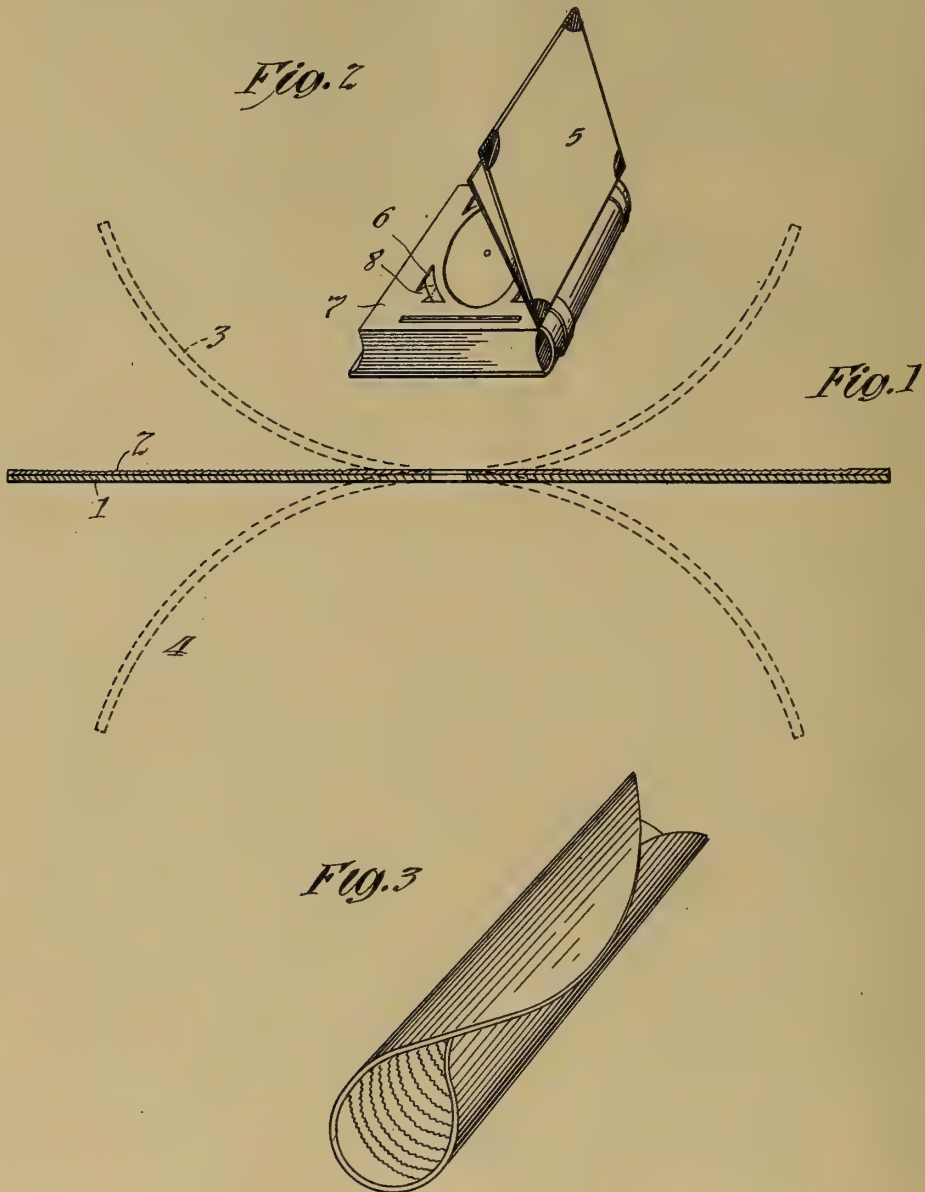
DISK SOUND RECORD,  
#1,146,387-----J. W. Aylsworth,  
Patented-July 13, 1915.  
FILED-February 3, 1910.



J. W. AYLSWORTH.  
DISK SOUND RECORD.  
APPLICATION FILED FEB. 3, 1910.

1,146,387.

Patented July 13, 1915.



*Witnesses:*  
Frank D. Lewis  
Dyer Smith

*Inventor:*  
Jones W. Aylsworth  
by Frank L. Dyer  
his Atty.

# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## DISK SOUND-RECORD.

1,146,387.

Specification of Letters Patent. Patented July 13, 1915.

Application filed February 3, 1910. Serial No. 541,764.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Disk Sound-Records, of which the following is a description.

My invention relates to the manufacture of disk sound records, and my objects are the production of a record in the form of an exceedingly thin elastic disk which may be rolled and conveniently sent through the mails, or filed in a suitable portfolio.

My invention also permits me to form a record from materials well suited for record surfaces, but which materials cannot advantageously be used in the ordinary construction of disk records, because of the cost of the same. Heretofore, phonographic records of the disk type have been made in relatively thick disks comprising the record surface and a backing for the same. The backing and the record surface are sometimes made of the same material and sometimes of different materials. Such records are not adapted to be conveniently sent through the mails or to be filed in a portfolio.

My improved record comprises preferably a thin flexible sheet of cellular texture, such as paper or fabric having a hard elastic surface formed thereon of sufficient plasticity when hot to take a permanent impression of the record matrix by pressure. Or, my record may take the form of an exceedingly thin disk formed of a hard substance, which by virtue of its thinness is sufficiently flexible to be rolled, but is non-distortable. A record such as that described is adapted to be played on a machine wherein the permanent table or support for the record forms the backing for the record when used. A phonograph having a permanent record support with which such a record is adapted to be used, has been invented by me and is described in application Serial No. 541,763, filed on even date herewith, upon which application U. S. Patent No. 1,062,579 has been granted.

Attention is hereby directed to the accompanying drawings forming part of this specification, and in which—

Figure 1 represents a cross sectional view through my improved record, the manner in

which the same may be rolled in either direction being diagrammatically indicated. Fig. 2 represents in perspective the manner in which the record may be filed in a portfolio; and Fig. 3 is a perspective view of my improved record rolled into position to be sent through the mail.

I prefer to form my record of a thin elastic yielding backing indicated by 1 in the drawings, and an elastic non-stretching record surface indicated by 2 in the drawings. The backing 1 is preferably in the form of a thin sheet of softened paper or fabric, the pores and interstices of which are filled with an elastic yielding filler, such as linseed oil, rubber, or celluloid softened to the point at which it becomes permanently flexible and yielding. Celluloid may be so softened by combining it with castor oil or chlorinated stearic acid or other halogenized fatty acid, as disclosed in my application Serial No. 319,465, filed May 31, 1906, upon which U. S. Patent No. 962,877 has been granted. This backing 1 has one side thereof coated with a thin surface or film of a hard elastic material 2, which by virtue of its thinness is sufficiently flexible for the objects sought for in the invention.

Materials well adapted for the record surface are films of cellulose esters, such as celluloid, cellulose acetate, and structureless cellulose, casein film, and condensation products of phenols and formaldehyde or other substance containing the methylene radical  $\text{CH}_2$ . Such films may be formed directly on the flexible backing 1, or they may be separately formed and cemented to the backing during the pressing of the record. The record so formed will have a record face which is flexible and hard, but which will not stretch or distort, and a flexible elastic yielding backing so constructed that when the record is bent or rolled, the backing will suitably stretch or compress. Thus, when the record is bent in such a way that the record face is concave, as shown at 3 in Fig. 1, the record face 2 will not distort, but the backing will stretch sufficiently to maintain its position. When the record is bent or rolled so that the record face becomes convex, as shown at 4 in Fig. 1, the backing will compress sufficiently to maintain its position, while the record face 2 does not stretch or distort. Thus, my record might be described as one having an elastic non-stretching rec-



ord surface, and a thin elastic yielding support or backing adapted to be held flat during reproduction by a suitable specially designed means. My invention also comprises broadly a sound record formed of a thin disk of a hard substance, which by virtue of its thinness is flexible, but cannot be distorted by rolling or bending. Such a disk might be formed of an exceedingly thin sheet of celluloid or other of the materials for record surfaces noted above, which record might be used without backing when supported by a record supporting table of the character described in my application Serial No. 541,763, referred to, but which could not be played when supported by the usual type of talking machine turn table. If the record surface is formed of a phenol-formaldehyde condensation product, the same is preferably a final condensation product such as described in my application Serial No. 496,060, filed May 14, 1909, upon which U. S. Patent No. 1,102,630 has been granted. As pointed out in said application, the reaction between phenol or its recognized equivalents and formaldehyde or its polymers or other recognized equivalents produces condensation products of various degrees of hardness and fusibility. By the reaction between these substances in proper portions, it is possible to form a condensation product which is fusible and soluble in common solvents and in which there is no excess of free formaldehyde or its equivalent. When formaldehyde or its equivalent is added to the resinized phenol or phenol resin so produced and the mass is heated to a temperature suitable for the reaction, an infusible final hardened condensation product is formed, which is chemically inert and insoluble in common solvents. Such a final condensation product may be made sufficiently plastic when heated to take a record impression from a suitable matrix, this plasticity being given to the product by the addition of an element which I term in said application Serial No. 496,060 a "final product solvent element". By final product solvent element, I include substances which will dissolve the ultimate condensation product or combine therewith at baking temperature, render it plastic at such temperature, and remain as a part of the product in the condition of solid solution. Examples of substances of this class are naphthalene and some of its derivatives, such as nitro and chloro derivatives. Naphthalene tends to volatilize at ordinary temperatures when alone. It does not, however, volatilize perceptibly at ordinary temperatures when used in proper proportions in solid solution with the ultimate phenolic condensation product. Thus, the record impression may be given to the record surface of phenol aldehyde final condensation product after

the final reaction in the substance has taken place. Or, if desired, the final reaction of the substance may be allowed to take place in the mold during the pressing of the record therein.

In Fig. 2 of the drawings, I have shown a portfolio 5 wherein records of the excessive thinness disclosed may be filed for convenience in keeping the same. This portfolio is of common character and is adapted to file a record between each sheet. As shown in the drawing, the edge of a record 6 is held in place at each corner of the sheet 7 of the portfolio by means of the flap 8 over which the edge of the record 6 projects. A record rolled into shape to be transmitted through the mail is shown in Fig. 3. A record such as described can be merely rolled and tied or otherwise secured in place, addressed and stamped and sent through the mail.

The invention claimed herein is limited to a flexible record, the article disclosed being more broadly claimed in an application of Aylsworth and Aiken, Serial No. 861,038, filed September 10, 1914.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. As a new article of manufacture, a sound record comprising a flexible disk formed of an elastic yielding backing and an elastic flexible record surface of a hard infusible condensation product of a phenol and a substance containing the methylene radical, substantially as described.

2. As a new article of manufacture, a sound record comprising a flexible backing and a flexible surface portion formed of a final condensation product of a phenol and a substance containing the methylene radical, said surface portion being sufficiently plastic when heated to take a record impression from a record matrix, substantially as described.

3. As a new article of manufacture, a sound record comprising a flexible backing formed of a thin sheet of cellular material, the pores and interstices of which are filled with an elastic yielding material to render said sheet permanently extensible and compressible, and a flexible record surface of a hard infusible and non-stretching material which is non-plastic when cold, substantially as described.

4. As a new article of manufacture, a sound record comprising a flexible backing formed of a thin sheet of cellular material, the pores and interstices of which are completely filled with an elastic yielding material, and a flexible record surface of a hard infusible condensation product of a phenol and a substance containing the methylene radical, substantially as described.

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5. As a new article of manufacture, a sound record comprising a thin flexible disk having a surface portion formed of a hard infusible condensation product of a phenol and a substance containing the methylene radical, said product being sufficiently plastic when heated to take a record impression from a record matrix, substantially as described.
6. As a new article of manufacture, a sound record comprising a flexible backing formed of a thin sheet of cellular material, the pores and interstices of which are filled with an elastic yielding material to render said sheet permanently extensible and compressible, and a flexible surface portion formed of a final condensation product of a phenol and a substance containing the methylene radical, said surface portion being sufficiently plastic when heated to take a record impression from a record matrix, substantially as described.
7. As a new article of manufacture, a flexible sound record comprising a flexible backing and a flexible surface portion formed of a final hardened phenolic condensation product containing a final product solvent element, substantially as described.
8. As a new article of manufacture, a thin flexible sound record having a surface portion formed of a final hardened phenolic condensation product containing a final product solvent element, substantially as described.
9. As a new article of manufacture, a flexible sound record comprising a flexible backing and a flexible surface portion formed of a final hardened phenolic condensation product containing a non-volatile final product solvent element, substantially as described.

This specification signed and witnessed this 2d day of February 1910.

JONAS W. AYLSWORTH.

Witnesses:

DYER SMITH,

ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various stages of human civilization, from the earliest primitive societies to the modern world of science and industry. He traces the development of language, art, and science, and shows how these have shaped the course of human progress. The second part of the book is a detailed account of the history of the British Empire, from its beginnings in the sixteenth century to its present extent. The author describes the various colonies and territories that have been acquired by Britain, and the role of the Empire in the world. He also discusses the political and economic relations between Britain and her colonies, and the impact of the Empire on the world as a whole.

The third part of the book is a study of the present position of the British Empire, and the prospects for its future. The author examines the various factors that are influencing the Empire, such as the growth of industry, the development of science, and the changing political and economic relations between Britain and her colonies. He also discusses the various proposals for the reorganization of the Empire, and the views of the different groups of people who are interested in its future. The book concludes with a chapter on the future of the world, and the role of the British Empire in it.

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# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PROCESS FOR MAKING SOUND-RECORDS.

1,146,388.

Specification of Letters Patent.

Patented July 13, 1915.

No Drawing.

Application filed February 11, 1910. Serial No. 543,236.

### *To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Processes for Making Sound-Records, of which the following is a description.

My invention relates to sound records formed of refractory condensation products and to a process for manufacturing the same, and my object is to produce records of improved quality, life, and other valuable characteristics from substances of the class described in a simple, inexpensive and efficacious manner. The materials from which I manufacture the sound records are in their final state non-fusible, insoluble and difficult to mold by processes requiring the material to be cast or pressed while in a plastic state.

The materials referred to are condensation products of phenol or equivalent substances, and formaldehyde or other material containing the methylene radical  $\text{CH}_2$ . It has been proposed to carry the reaction of such substances to an intermediate state only and to harden the same in a mold in which they are shaped to the final, refractory and infusible condition. The hardening reaction of such intermediate phenolic condensation products and other condensation reactions of similar character requires a considerable time even when a relatively high temperature is employed, resulting in the necessity of employing expensive matrices in large numbers in order that the required output of a given sound record may be obtained, and which accordingly, curtails the number of facsimiles which may be made from each matrix per diem.

My invention greatly increases the number of records which may be made from each matrix per day, and also obviates another objectionable feature incident to the manufacture of sound records molded from condensation products wherein the reaction is caused to culminate entirely or in part, while the product is inclosed in the matrix under the influence of heat and pressure, which consists in the entrapping of by products of the reaction within the inter-molecular spaces of the product. These by products may consist of water vapor, vapor of ammonia, excess of formaldehyde or other ma-

terial containing the methylene radical, etc., according to the specific character of the composition employed. These gaseous products even though they may be small in amount, impair the surface of the record to an extent causing a phonetic roughness, and otherwise impair the quality of a high grade record.

My invention relates specifically to the molding of disk records of either the vertical or transverse groove type, although it is obvious that the same methods may be used for making the cylindrical type of record.

My invention comprises broadly a process for manufacturing records and a sound record as a new article of manufacture composed of the ingredients hereinafter to be described, which record may broadly be of either the disk or cylindrical type; my invention also comprises specifically, a disk sound record formed in the manner and by the specific process to be described.

The process of manufacturing disk records involves four principal steps or operations.

The first step consists in the preparation of the composition in such a manner that the components thereof may react chemically or harden to form a hard infusible product when subsequently heated to the proper reacting temperature.

The second step consists in heating the composition to the desired form in a blank mold heated only sufficiently to render the composition plastic, so that it may be compressed to fill the mold and weld the mass to a solid unit of the desired shape. This blank has not so far been given its final hardening.

The third step consists in removing the blank so formed from the mold, heating it in a suitable receptacle for the purpose of hardening or completing the reaction, and permitting the by products of the reaction to evaporate or escape from the blank.

The fourth step consists in pressing the hardened blank in a hot matrix to form the desired sound record.

The material which I use for forming blanks and subsequently records therefrom, is of such a character that in its final condition it is refractory, infusible, insoluble, but is rendered sufficiently plastic by application of a suitable amount of heat to take a

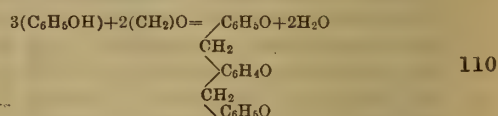


perfect impression from the mold. Final condensation products of phenol and formaldehyde or other methylene-containing agents can usually not be rendered sufficiently plastic by the action of heat to take an impression from a mold or die, but my improved composition has this characteristic because of the inclusion therein of an element of the class which I denote as final product solvent elements, as disclosed in my application Serial No. 496,060, filed May 14, 1909, and entitled plastic composition and process of manufacturing the same upon which U. S. Patent No. 1,102,630 has been granted.

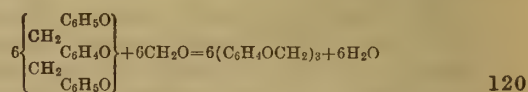
It may be well to state that it is now well known that phenolic bodies may be caused to react when combined with formaldehyde or polymers thereof to form condensation products of various degrees of hardness and infusibility. One type of these products are fusible resinous products which are known by the general name of shellac substitutes. These are soluble in various solvents, may be melted, and are suitable generally for use as substitutes for shellac and similar uses. The other type of reaction products referred to is a hard infusible insoluble amorphous mass which is chemically inert. A great practical difficulty in the use of the last named product has been that when the reaction has been carried on at sufficiently high temperatures and with sufficient energy to enable the product to be formed within a reasonably short time, gases of dissociation of formaldehyde or the like have been evolved, together with water vapors, which have rendered the mass porous and consequently unfit for most industrial applications. It has been proposed to hasten the reaction by the use of catalytic or so-called condensing agents in small quantity, which, however, leave objectionable components in the mass or traces thereof, result in the evolution of gas, and aid in the setting up of internal stresses within the substance, which render it brittle and distorted and shorten the life and usefulness of the product. It has also been proposed to perform the final reaction in such substances under counteracting pressure, which prevents in large measure, the formation of objectionable bubbles and porosity, this process being similar to the well known method of vulcanizing rubber and the employment of pressure in the manufacture of other industrial compositions. The use of such pressure results in the entrapping of water vapors and other gases within the substance in the manner described in my application Serial No. 543,238, entitled phenolic condensation product and method of preparing same, filed Feb. 11, 1910, upon which U. S. Patent No. 1,120,593 has been granted. This result necessarily takes place if the counteracting

pressure is greater than the pressure of the water vapor or other gases, as it must be to prevent the escape of such gases during the reaction.

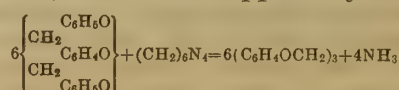
In my application Serial No. 496,060 above referred to, I describe a final phenolic condensation product and a method of preparing the same in which catalytic agents are not required, and in which the use of a counteracting pressure during the final reaction is not necessary. This result is attained by the formation, first, of a final or permanently fusible primary reaction product in which the formaldehyde or methylene-containing element is all combined with the phenol, and the phenol is all or practically all combined with the aldehyde. A hardening reaction is then caused to take place between this product and formaldehyde or a polymer thereof in quantity just sufficient to combine with all of the fusible condensation product to form the final hard condensation product, the methylene-containing or hardening ingredient being used in relatively small quantities and the heat of the reaction being regulated to prevent the escape of formaldehyde gas during the reaction. It was my discovery that formaldehyde or other methylene-containing agent and a phenolic body may be combined and caused to react in such proportions that the fusible condensation product referred to is formed, and this substance may then be combined with a further amount of formaldehyde or other methylene-containing ingredient to form the final condensation product. The proportions required for the formation of the fusible product referred to in order to get the best results are three parts of phenol to two parts of formaldehyde by molecular weights. This apparently causes the chemical reaction



The final hardening reaction when paraform or other anhydrous form of formaldehyde is used apparently causes the chemical reaction—



when the paraform is used in suitable quantity. When hexa-methylene-tetra-amin is used in place of the paraform, as described in application Serial No. 543,238 above referred to, the reaction apparently is



The product formed by either reaction



hardens on the application of a suitable amount of heat to an infusible refractory resinous amorphous mass of a pale amber color when the reacting substances are pure.

5 Subsequent to the date of my invention embodied in application Serial No. 496,060 above referred to, I discovered that a substance containing a methylene radical other than the oxid or hydroxid and preferably  
10 hexa-methylene-amin or hexa-methylene-tetra-amin, as it is sometimes called ( $\text{CH}_2$ )<sub>6</sub>N<sub>4</sub>, or other methylene-amin compound, might be substituted for the para-form or other aldehyde element used in the  
15 final reaction for hardening the substance with improved effect. This discovery is embodied in my application Serial No. 543,238, referred to. The hexa-methylene-amin or other methylene-amin compound possesses  
20 the chief advantage over the aldehyde to perform the desired function in that it is not necessary to take great care to limit the amount of the methylene-amin to the exact proportion necessary for combining with the  
25 fusible condensation product, since gas is not evolved during the reaction if the methylene-amin is present in excess, the methylene-amin only parting with its methylene upon reaction with the fusible  
30 condensation product in exchange for hydrogen from the fusible product, which unites with the nitrogen of the methylene-amin to form ammonia.

My improved phonograph record is  
35 formed from the substances described in the applications referred to and takes advantage of the discoveries therein recited.

While the use of the specific fusible product referred to is preferable, I may use various of the so-called shellac substitutes on the  
40 market for combination with the methylene-containing ingredient to form the final product with good results. So far as I know, no one prior to my discoveries above  
45 referred to, formed a final condensation phenolic product by first forming a fusible product and adding thereto an ingredient which upon further heat treatment resulted in a final infusible condensation product,  
50 nor was the nature of the substances referred to accurately known. The general practice was to mix together in the first place all the ingredients necessary for the formation of the final infusible product, and to heat the  
55 same either in one or several stages to produce the final product. This resulted in the formation of a product which at all stages prior to the formation of the final product contained free or uncombined formaldehyde  
60 or methylene-containing element, which, at the heat of the main reaction tended constantly to escape as gas. Other advantages of this method of procedure over the former method referred to and of the product so  
65 formed over the products previously known

of the class described, are fully set forth in my applications referred to above.

The first step noted above in the formation of my improved sound record comprises the mixing together of a completed fusible  
70 soluble condensation product, such as certain shellac substitutes of phenolic origin, or the phenol resin referred to above and fully described in my co-pending applications above referred to, together with the following  
75 substances: a final product solvent element or plasticity component; a methylene-containing agent or substance which will yield the methylene radical in exchange for an equivalent amount of hydrogen from the  
80 phenolic resin; a suitable filling component, such as inert powdered materials of mineral or organic nature. Each of these components is present in proper proportion to form a completed product of desired color,  
85 hardness and texture, when submitted to the subsequent operations.

Examples of compositions of the class specified are the following:

Phenol resin or equivalent shellac substitute—100 parts by weight. 90

Solid solvent or plasticity component such as meta-di-nitro-benzole, nitro-naphthalene, camphor, stearic amid or other solid acid amids of the acetic series—10 to 20 parts. 95

Methylene yielding agent such as hexa-methylene-amin, tri-oxy-methylene, thio-formic-aldehyde—7 to 11 parts.

Pigment such as lamp black—2 to 5 parts.

Mineral filling agent such as plaster of Paris, barium sulfate, infusorial earth, clay, etc.—50 to 300 parts, or as an alternative, an organic filling agent such as powdered  
100 amber, wood flour, ivory nut dust, insoluble casein salts, infusible resins, infusible  
105 condensation products in powdered form—50 to 100 parts.

Of the above named solid solvents or plasticity components, meta-di-nitro-benzol and nitro-naphthalene are preferred because  
110 they are neither volatile nor water soluble. The equivalents of these components could, of course, also be used.

The composition may be mixed by powerful kneading machines or ground or rolled  
115 at temperatures below the reaction temperature which for the above type of composition is about 180 degrees F. The mixed material may be pulverized or may be formed in rough cakes suitable for compressing or  
120 consolidating in subsequent molding operations.

The second step comprises the consolidation of the powdered substances or compression of the rough cake into a suitable heated  
125 blank mold by hydraulic or other pressure and the removal of the blank from the mold, which may be accomplished without cooling when some compositions are used, while with others it is necessary to first cool the mass. 130



The third step comprises heating the blanks to a proper reaction temperature for a sufficient time to allow the complete hardening reaction to take place and drying out or expelling the undesirable reaction products previously mentioned. During this operation, the blank may be supported in such a manner that it will lie flat and that the reaction by products may escape readily. It is obvious that as much time as is required may be used in this operation, even though it takes several hours or even days, without injurious consequences, since no expensive molds are involved and caused to remain idle during this step of the process.

When the blanks are hardened in finished condition they may be stored for indefinite periods preparatory to use in the fourth step of the process, consisting in pressing the blanks to make sound records from suitable matrices, or they may be taken at once from the oven while still hot and placed in the record matrix, which is also heated to the proper temperature for rendering the particular composition used sufficiently plastic to take the impression of the sound waves from the matrix. This fourth step is carried out by means of hydraulic presses, and the matrices are cooled in the presses, this operation requiring the use of the mold but a few moments. Records thus made have no tendency to stick to the mold, which is often the result when the final reaction is caused to take place within the mold. Furthermore, the records may be repressed if desired to make them over when obsolete. Furthermore, there is no tendency for the filling material in the composition to injure or wear the matrix or for the components of the composition to corrode the matrix when the composition is made as described in contradistinction to similar records made when the operation is carried on by heat and pressure within the matrix.

When cylindrical sound records are to be made in accordance with my invention, the ingredients are prepared, mixed and consolidated to shape in a blank cylindrical mold, the mold being heated and pressure applied in any desirable manner to mold the blank. Preferably, the heat employed is of a temperature less than the reaction temperature of the composition. The blank is then cooled and upon shrinking sufficiently is removed from the blank mold by direct longitudinal movement thereof. It is then heated in an oven or other suitable receptacle sufficiently to permit the hardening reaction to take place and the harmful reaction by products to escape in the manner referred to in connection with the process as applied to disk records. The blanks thus formed are pressed in a suitable cylindrical matrix to form the sound record on their outer surfaces, while the blanks are in plastic condition, the

blanks either being put into the molds directly from the oven while still hot, or if they are stored for future use, they may be heated sufficiently to become plastic before being placed in the sound record matrix. The pressure may be applied upon the blanks to form the record in any suitable manner, and the records thus formed are cooled sufficiently to shrink away from the record surface, when they may be removed from the mold, or they may be removed by means of suction applied to the interior of the record or pressure applied to the outer surface of the record, or both, as disclosed in my application Serial No. 487,360, filed Apr. 1, 1909, upon which U. S. Patent No. 1,036,416 has been granted.

While I consider it preferable to form sound records and blanks by the processes described, it should be understood that my invention comprises broadly sound records and blanks formed of the substances described by any suitable process, such records being, to the best of my knowledge, novel articles of manufacture however formed. Thus, while I prefer to form sound records by the processes described, in which the record is formed upon the blank by pressing, it is possible to form records of the substances described by a casting operation, that is to say, by carrying on all the necessary reactions to form the final article within the mold itself. It also should be understood that any water vapor contained within the mass may be absorbed by a suitable percentage of a water-absorbing element, as described in my application Serial No. 496,060, and that if a methylene-amin compound is used as a hardening agent, as is described in my application Serial No. 543,238 above referred to, the ammonia evolved may be fixed by the addition of a small percentage of an ammonia fixing agent to the mass, such as one of the anhydrides of the higher members of the acids of the acetic series or phthalic or benzoic anhydrid, which results in the formation of an acid amid, which substance has the desirable properties of acting as a final product solvent agent or plasticity or water-combining agent, as well as an ammonia fixing agent.

The sound record formed by any of the processes described above is exceedingly hard and is exceptionally well adapted to give a sound reproduction of excellent quality when played. I have found that the yielding by elasticity of the record surface when tracked by a small reproducing stylus point is very pronounced with all of the well known hard wax or metallic soap compositions, and results in a weaker reproduction than would otherwise be the case. The volume of sound and clearness of definition on reproduction increases directly with the hardness of the record substance, as indi-



cated by any known method of measuring hardness. Accordingly, as stated, the composition of which I now propose to form sound records, because of its exceeding hardness gives a greatly improved reproduction.

The article disclosed herein is claimed in my copending application Serial No. 30,197, filed May 24, 1915, which is a division of this application.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. The process of forming sound records which consists in forming a blank of final hardened phenolic condensation product of such a nature as to be rendered sufficiently plastic by subsequent application of heat to take a clear impression from a sound record matrix, heating the same to render the same plastic, and then pressing the same into a suitable sound record matrix, substantially as described.

2. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water-soluble final product solvent, and an anhydrous hardening agent, heating the composition to harden it, and forming a sound record therefrom in a suitable mold, substantially as described.

3. The process of forming sound record blanks which comprises mixing together a permanently fusible phenolic product and an agent capable of reacting chemically with said product to form a hardened phenolic condensation product, consolidating said ingredients into a sound record blank, and transforming the same by chemical action into said hardened product, substantially as described.

4. The process of forming sound record blanks which comprises mixing together ingredients which react chemically to form a final hardened phenolic condensation product together with a non-volatile and non-water soluble final product solvent, consolidating said ingredients into shape, and heating said ingredients to form said final hardened product by chemical action, substantially as described.

5. The process of forming sound record blanks which consists in mixing together a fusible phenol resin, a non-volatile and non-water soluble final product solvent and a methylene containing substance at a temperature below the reaction temperature of the composition, forming a blank therefrom in a suitable mold, removing the blank from the mold, and heating the same sufficiently to cause the hardening of the composition by chemical action, substantially as described.

6. The process of forming sound record blanks which consists in mixing together a

fusible phenol resin, a non-volatile and non-water soluble final product solvent and a methylene containing substance at a temperature below the reaction temperature of the composition, forming a blank therefrom in a suitable mold, and heating the same sufficiently to cause the hardening of the composition by chemical action, substantially as described.

7. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water soluble final product solvent, an inert filling material, and an anhydrous hardening agent, heating the composition to harden it and forming a sound record therefrom in a suitable mold, substantially as described.

8. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water-soluble final product solvent and an anhydrous hardening agent containing the methylene radical at a temperature below the reaction temperature of the composition, molding to shape, heating sufficiently to cause the final hardening reaction, and forming the sound record thereon when heated sufficiently to be sufficiently plastic, substantially as described.

9. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water-soluble final product solvent and methylene-amin compound or derivative, heating the composition to harden it, and forming a sound record therefrom in a suitable mold, substantially as described.

10. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water-soluble final product solvent, hexa-methylene-tetra-amin, and an inert filling material, heating the composition to harden it, and forming a sound record therefrom in a suitable mold, substantially as described.

11. The process of forming sound records which consists in mixing together ingredients which react on application of sufficient heat to form a hard final infusible phenolic condensation product together with a non-volatile and non-water-soluble final product solvent, molding the same into a blank, hardening by heat treatment to the final infusible product, rendering plastic by heat and pressing a sound record thereon, substantially as described.

12. The process of forming sound records which consists in mixing together ingredients which react on application of sufficient heat to form a hard final infusible phenolic condensation product together with a non-volatile and non-water-soluble final product solvent, molding the same into a blank under pressure and heat at a temperature less than the reaction temperature of the compo-

sition, removing from the blank mold, hardening by heat treatment to the final infusible product, rendering plastic by heat and pressing a sound record thereon, substantially as described.

13. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water-soluble final product solvent, and a methylene-containing hardening agent, molding in a heated blank mold, removing the blank therefrom and hardening by sufficient heat to cause the final reaction, and forming the sound record thereon by pressing the blank against a suitable matrix with the blank in plastic condition, substantially as described.

14. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water-soluble final product solvent, a filling material, and a methylene-containing hardening agent, molding in a heated blank mold, removing the blank therefrom and hardening by sufficient heat to cause the final reaction, and forming the sound record thereon by pressing the blank against a suitable matrix with the blank in plastic condition, substantially as described.

15. The process of forming sound records which consists in mixing together ingredients which react chemically on application of sufficient heat to form a hard final infusible phenolic condensation product together with a non-volatile and non-water-soluble final product solvent, forming the same into

a blank, hardening the blank by application of heat to the final infusible product, and pressing a sound record into the blank with the blank in a heated plastic condition, substantially as described.

16. The process of forming sound records which consists in mixing together a fusible phenol resin, a non-volatile and non-water-soluble final product solvent, and a methylene-containing hardening agent, forming the same into a blank, hardening the blank to an infusible state by application of sufficient heat, and pressing a sound record into the blank with the blank in a heated plastic condition, substantially as described.

17. The process of forming sound records which consists in mixing together ingredients which react chemically on application of sufficient heat to form a hard final infusible phenolic condensation product, together with a non-volatile and non-water-soluble final product solvent, molding the mixture in a heated blank mold, removing the blank thus formed from the blank mold, hardening the blank by sufficient heat to cause the final hardening reaction, and pressing a sound record into the blank with the blank in a heated plastic condition.

This specification signed and witnessed this 8th day of February 1910.

JONAS W. AYLSWORTH.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



It is hereby certified that in Letters Patent No. 1,146,390, granted July 13, 1915, upon the application of Jonas W. Aylsworth, of East Orange, New Jersey, for an improvement in "Methods of Molding Sound-Records and Other Objects," errors appear in the printed specification requiring correction as follows: Page 1, line 57, for the word "beznol" read *benzol*; same page, line 62, after the date February 11, 1910, insert the words and numerals *and upon which U. S. Patent No. 1,098,608, has been granted*, ; same page, lines 64-65, strike out the comma and the words and numerals "*, and upon which U. S. Patent No. 1,098,608, has been granted.*", and line 64, after the word "to" insert a period; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of September, A. D., 1915.

[SEAL.]

J. T. NEWTON,  
*Acting Commissioner of Patents.*





# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## METHOD OF MOLDING SOUND-RECORDS AND OTHER OBJECTS.

1,146,390.

Specification of Letters Patent. Patented July 13, 1915.

No Drawing. Original application filed August 26, 1910, Serial No. 579,130. Divided and this application filed November 4, 1910. Serial No. 590,602.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Method of Molding Sound-Records and other Objects, of which the following is a description.

My invention relates to a process of molding sound records and other objects, the process involving the formation of a surface layer of a hard final infusible insoluble phenolic condensation product upon the object.

This application is a division of my application Serial No. 579,130, filed August 26, 1910 for Process of molding sound records and other objects.

In an application filed by me on August 26, 1910, Serial No. 579,129, entitled Method of molding objects having a refractory surface layer, upon which application U. S. Patent No. 1,094,828 has been granted, I have described a method of molding sound records and other objects by coating the surface of a mold with a solution of ingredients, which, upon being heated, form a surface layer or veneer on the mold surface of a hard infusible insoluble phenolic condensation product having the mold impression formed on the outer surface thereof. The object to be surfaced is pressed into contact with this hardened veneer in the mold, with application of heat sufficient to cause the object or mass and the surface layer to become firmly welded together, the molded object then being cooled and removed from the mold with the surface layer adhering thereto. The process claimed herein is in some instances an improvement upon the process described in my application above referred to, and is in some aspects a specific embodiment thereof.

My present process will be described in connection with sound records, although it will be obvious that it may be applied to the formation of other molded objects with equally good results.

A blank mold surface is painted with or dipped in a solution of a fusible soluble phenolic condensation product and a hardening agent therefor, such as hexa-methylene-

tetra-amin, in a suitable solvent which may be either a volatile solvent, such as amyl alcohol, or a solid solvent, such as mono-nitro-naphthalene, oil of mirbane, di-nitro-beznol, and other solvents referred to in my application Serial No. 579,129, filed August 26, 1910. This coating upon the matrix may be the enamel lacquer or varnish described 60 in my application Serial No. 543,239, filed February 11, 1910, as stated in my application Serial No. 579,129, filed August 26, 1910, above referred to, and upon which U. S. Patent No. 1,098,608 has been granted. The 65 solvent used should be one whose boiling point is higher than the temperature at which it is desired to perform the final hardening reaction of the substance in solution into a refractory insoluble infusible con- 70 densation product.

Having coated the blank mold, the same is dried, and heated sufficiently to cause the ingredients of the coating to react to form the final infusible insoluble refractory product referred to. A blank phonograph record, which is preferably made of a phenolic condensation product or a mixture of the same with an inert filling material, is then pressed in the blank mold into contact with 80 the surfacing layer formed in the blank mold as described, heat being applied sufficiently to cause the welding of the surface layer to the blank, and the transfer of the surface layer from the blank mold to the 85 blank upon the cooling and withdrawal of the blank from the mold. The final hardening of the surface layer or varnish in the blank mold may be imparted to the same at the same time that the blank is expanded into contact therewith and welded thereto, it only being necessary to dry the surface coat in the blank mold before pressing the blank into contact therewith, with application of heat sufficient to cause the final reaction of 95 the surface layer and the welding of the same to the blank. The blank record thus formed with a smooth hardened surface layer is then pressed into or against a heated record matrix, the blank also being heated 100 if necessary. Because of the character of the surface layer of the blank and the presence therein of a plasticity component, such as described in my application Serial No.



496,060, the record is formed in the surface thereof by the matrix in much the same manner that the sound record is impressed upon a heated celluloid blank pressed into a mold. The record thus formed is cooled and withdrawn from the mold.

The process thus described is an extremely cheap and practical method of manufacture, because of the comparative cheapness of the blank molds in which the surface veneer is formed.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:—

1. The process of molding sound records, which consists in coating a blank matrix with a solution of substances which react upon application of heat to form a final hardened phenolic condensation product which is infusible and insoluble but sufficiently plastic when heated to take a record impression, drying the same, pressing a blank into contact with the coating of the matrix with application of heat to cause the transformation of the coating by chemical action into the final product aforesaid and at the same time the transfer of the coating from the matrix to the blank, withdrawing the coated blank from the matrix and pressing the blank thus formed into a record mold with sufficient application of heat to cause the sound record to be formed on the coating of the blank, substantially as described.

2. The process of molding sound records which consists in forming upon a blank matrix a coating of substances, including a solid solvent plasticity element, which coating is adapted to be transformed chemically by heat into an infusible insoluble phenolic condensation product, which becomes sufficiently plastic on subsequent application of heat to receive a record impression, drying the coating, pressing a blank into contact with the coating with application of sufficient heat to cause the transformation of the coating into the infusible product as aforesaid, and at the same time the transfer of the coating from the matrix to the blank, and the adhesion of the coating to the blank, withdrawing the coated blank from the matrix, and pressing the coated blank thus formed into a record mold with sufficient application of heat to cause the sound record to be formed on the coating of the blank, substantially as described.

3. The process of molding sound records which consists in coating a blank matrix

with ingredients which react upon application of heat to form a final hardened phenolic condensation product which is sufficiently plastic when heated to take a record impression, drying the coating, pressing a blank containing a phenolic condensation product into contact with the coating with application of heat to cause the transformation of the coating by chemical action into the final product aforesaid and at the same time the transfer of the same from the matrix to the blank, withdrawing the coated blank from the matrix, and pressing the blank thus formed into a record mold with sufficient application of heat to cause the sound record to be formed on the coating of the blank, substantially as described.

4. The process of molding sound records and other objects which consists in forming upon a blank matrix a coating of substances including a solid solvent plasticity agent, which coating is adapted to be transformed chemically by heat into hardened phenolic condensation product which becomes sufficiently plastic on subsequent application of heat to receive an impression, drying the coating, pressing a blank into contact with the coating with application of sufficient heat to cause a transformation of the coating into the hardened product as aforesaid and at the same time the transfer of the coating from the matrix to the blank, withdrawing the coated blank from the matrix, and heating the same and forming an impression therein, substantially as described.

5. The process of molding sound records and other objects which consists in forming upon a blank matrix a coating of substances including a solid solvent plasticity agent, which coating is adapted to be transformed chemically by heat into hardened phenolic condensation product which becomes sufficiently plastic on subsequent application of heat to receive an impression, drying the coating, pressing a blank into contact with the coating with application of sufficient heat to cause a transformation of the coating into the hardened product as aforesaid and at the same time the transfer of the coating from the matrix to the blank, and withdrawing the coated blank from the matrix, substantially as described.

This specification signed and witnessed this 1st day of November 1910.

JONAS W. AYLSWORTH.

Witnesses:

DYER SMITH,

ANNA R. KLEHM.



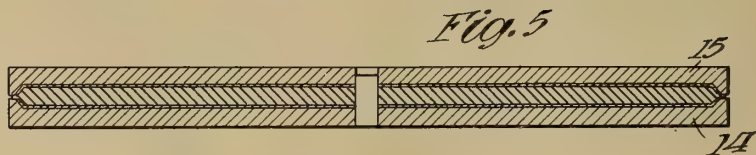
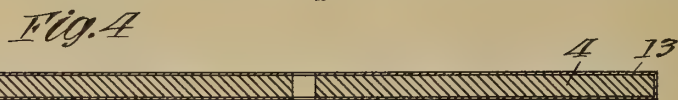
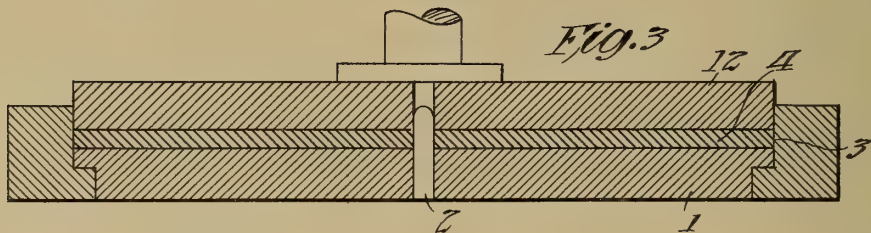
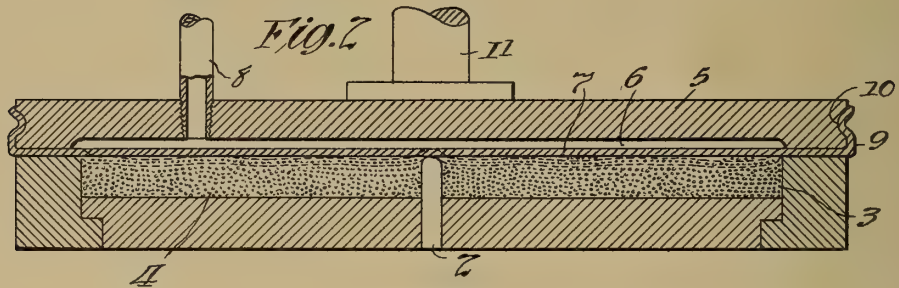
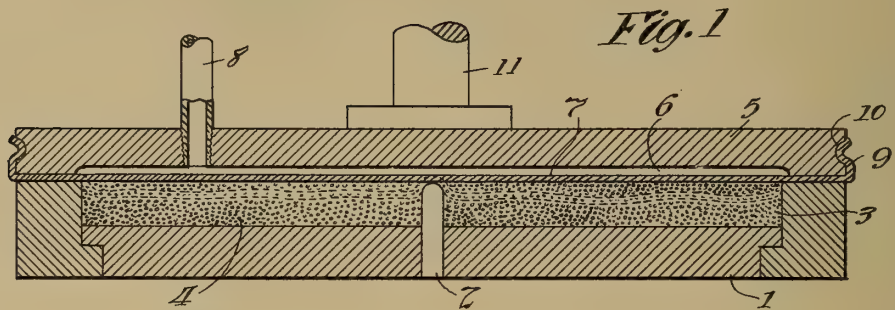
METHOD FOR PRODUCING TABLETS FOR  
SOUND RECORDS,

# 1,146,413----- Thomas A. Edison,  
Patented-July 13, 1915.  
Filed-December 20, 1911.

T. A. EDISON.  
METHOD FOR PRODUCING TABLETS FOR SOUND RECORDS.  
APPLICATION FILED DEC. 20, 1911.

1,146,413.

Patented July 13, 1915.



*Witnesses:*  
Frank D. Lewis  
Frederick Bachmann.

*Inventor:*  
Thomas A. Edison  
by Frank C. Over  
his Atty

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## METHOD FOR PRODUCING TABLETS FOR SOUND-RECORDS.

1,146,413.

Specification of Letters Patent.

Patented July 13, 1915.

Application filed December 20, 1911. Serial No. 666,888.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Method for Producing Tablets for Sound-Records, of which the following is a description.

My invention relates to methods and apparatus for producing tablets for sound records, more particularly for sound records of the flat or disk type having a surface of an exceedingly hard material such, for example, as the condensation products, which form the subject matter of the U. S. Patents of Jonas W. Aylsworth, Nos. 1,102,630, 1,020,593, 1,098,608 and 1,046,137, the method only being claimed in this case. In pressing a blank tablet of this type into the record matrix, unless the tablet or the base or backing therefor is of substantially uniform density throughout, it is practically impossible on account of the excessive pressure in the "hard spots" and the deficiency of pressure in the "soft spots" to obtain a perfect impression over the entire record surface. Furthermore, I have found in practice that if an ordinary mass of powdered material or stock of substantially uniform thickness is placed in a mold between the ordinary rigid mold plates, it is practically impossible to obtain the necessary evenness or uniformity in the density of the tablet, the unevenness being apparently due to the fact that the powdered material lies more compactly in some places than in others.

The principal object of my invention is to provide an improved process and apparatus whereby a tablet having the necessary uniformity of density may be readily obtained from powdered material or stock.

Other objects of my invention will appear more fully in the following specification and appended claims.

In conformity with my invention, the material or stock from which the tablet is molded is placed in a powdered condition in the mold and is there subjected to a uniform pressure applied in such a way as to compact the stock to a mass of substantially uniform density. After this, the surface of the stock is evened off in any suitable way

to prepare the compacted mass for compression to the desired form. If desired, the stock may be compacted and evened off a second time; and these operations may be repeated any number of times, but I have found in practice that it is ordinarily sufficient to compact and even off the stock a single time.

While it is evident that the compacting pressure may be applied in any suitable way so long as it acts uniformly over the whole of the exposed surface of the stock in the mold, I prefer to apply the same by a fluid, such as air, under pressure; as such a pressure acts readily upon all portions of the surface of the stock, regardless of the irregularities therein. In order to prevent scattering of the powdered material by the air or other fluid employed, I preferably apply the fluid pressure to the back of a flexible membrane or diaphragm of suitable material, such as rubber, adapted to engage the surface of the stock.

After the stock is compacted, as described above, to a mass of uniform density, the surface thereof to which the pressure has been applied is found to be undulatory or covered with high and low spots. To even off this surface I preferably again fill the mold, after which the stock may be molded under heat and pressure to the desired shape. The surface of the tablet is now provided with a veneer or veneers of impressible material adapted to receive the record impression. Although this veneer may be applied in any suitable way, I prefer to apply the same by the process set forth in an application of Jonas W. Aylsworth, Serial No. 579,130, filed August 26, 1910, and entitled "Method of molding sound records and other objects." In accordance with this process, the veneer is formed by coating the material of which the same is composed upon the surface of a blank mold, the tablet to be coated being pressed into contact with the coating in the mold with the application of sufficient heat to cause the coating to firmly adhere to the tablet. After this, the coated tablet may be removed from the mold and pressed with sufficient application of heat into a suitable record mold to cause the sound record to be formed on the surface thereof. In order to cause the surface veneer to adhere firmly



to the rough backing, I preferably cover the latter, prior to the transfer of the veneer, with a very thin coating of the material of which the veneer is formed. This coating should be pressed into the rough tablet in order to completely fill the surface pores thereof.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawing forming a part of this specification and illustrating various steps of my improved process and the apparatus for carrying the same into effect.

In the drawings, Figures 1 and 2 represent central vertical sectional views of the lower mold member filled with stock and covered with one form of my improved apparatus for compacting the stock, the dotted lines in these two figures indicating the respective positions of the flexible diaphragm or membrane after successive compactings. Fig. 3 represents a similar view of the complete mold after the formation of the rough tablet. Fig. 4 illustrates the rough tablet covered with a thin coating of the surface material prior to the application of surface veneers to the opposite faces thereof. Fig. 5 represents a similar view of the coated tablet placed in a mold for compressing the coating into the tablet and for forming the periphery of the latter. Fig. 6 represents a similar view of the apparatus for securing the surface veneers to the tablet, the tablet and the veneers being shown in position in the apparatus.

As shown in the drawings, the numeral 1 indicates the base of a mold having a centering pin 2, and a recess 3 of uniform depth in which the stock or material 4 to be molded is placed. A member 5 provided with a recess 6 is adapted to rest on the base of the mold with the recess 6 above the recess 3, the former recess being covered by a flexible membrane or diaphragm 7, forming thereby a closed chamber in the member 5. The numeral 8 designates a suitable air or fluid inlet for the said chamber. The membrane 7 is preferably provided with an upwardly directed portion 9 engaging firmly in a peripheral recess 10 in the member 5 whereby the membrane or diaphragm 7 is firmly secured to the member 5. If the said membrane is made of a yieldable material such as rubber, the contraction of the same when stretched over the member 5 will be sufficient to draw the flange 9 into close contact with the recess 10. The membrane 7 extends preferably across the portion of the member 5 adapted to engage the base of the mold so that when the said member is held in position on the said base by a suitable pressure applying member 11, the membrane because of its yielding character will form a tight joint between the base of the mold and the member 5.

In carrying out my improved process, the base of the mold is preferably filled with powdered stock, after which the compacting device above described is placed above the same and held firmly thereon by the member 11, fluid under pressure being thereupon introduced from any suitable source through the inlet 8 into the chamber above the membrane 7 which is thereby pressed upon the record material or stock to compact the same in the mold. By reason of the uniformity of the pressure upon the upper surface of the membrane and the ability of the latter to conform to the exact shape of the upper surface of the stock, the latter is compacted to a mass having a substantially uniform density throughout, the position of the membrane after this operation being shown in dotted lines in Fig. 1. The member 5 and the parts connected thereto are now removed from the top of the mold and the latter is again filled and leveled off with powdered stock to even off the surface of the latter. This operation of compacting the stock and evening off the upper surface thereof may be repeated any desired number of times, but, as above stated, I have found in practice that satisfactory results are obtained when the stock is compacted and evened off a single time. In Fig. 2, the dotted lines indicate roughly the position of the diaphragm or membrane after a second compacting operation. After the material has been suitably compacted, the upper member 12 of the mold is forced downwardly upon the stock, sufficient heat being applied to cause the latter to become slightly plastic; so that after cooling, a rough tablet of substantially uniform density and thickness is obtained.

The composition for the rough tablet may be mixtures of wood pulp or other filling agents and a fusible condensation product such as the wellknown shellac substitutes and other substances, which are referred to by the term "phenol resin" in applications of Jonas W. Aylsworth, Serial Nos. 496,060 and 541,764, the term "phenol resin" being intended to include cresol and other equivalents of phenol. A suitable composition may be formed from the ordinary shellac mixtures with wood pulp. Any other suitable composition may be employed. The rough blank or tablet having been obtained, the same is provided with a thin coating of the material which is to constitute the incompressible surface of the tablet, this coating being shown at 13 in Fig. 4. This material may be and preferably is the enamel lacquer or varnish described in application of Jonas W. Aylsworth, Serial No. 543,239, which lacquer or varnish comprises broadly a fusible resin of phenolic origin, which has mixed therewith a substance which is adapted to react with the resin upon the applica-



tion of sufficient heat to form a hard insoluble condensation product, the lacquer or varnish also containing a plasticity ingredient whereby it is adapted after hardening to receive a sound record impression upon application of sufficient heat. This varnish is preferably sprayed onto the rough tablet in the manner and by the means described in my applications filed on Oct. 26, 1912, Serial Nos. 727,828 and 727,829. In order to force the said coating into the pores on the surface of the rough blank and also to form the periphery of the said blank, I press the latter between the two plates 14 and 15 of a mold, sufficient heat being applied to permit the ready forming of the periphery of the tablet, as indicated in Fig. 5, but not to harden the varnish. Blank molds 16 and 17 are now coated, preferably in the same manner as the rough blank, with a solution of the surface material. These molds having been coated, the same are dried; and the rough tablet is then pressed between the same in contact with the surfacing layers or veneers formed upon the same, as clearly indicated in Fig. 6. In the said figure, the numeral 18 represents the lower member of a press. It is understood that during the operation sufficient heat is applied to cause the welding of the surface veneers to the blank and the transfer of the said veneers to the rough blank or tablet upon the cooling and withdrawal of the same from the mold. If the enamel lacquer or varnish referred to above is employed for the surfacing material, the same may be converted on the application of heat into a final infusible insoluble refractory product. The heat to cause this transformation may be applied before the veneers are transferred to the rough tablet or blank, or the same may be applied during the said operation. I, however, consider the former method preferable because the residues of the solvent employed in making the varnish are thereby permitted to escape more readily. The heating is preferably done in successive stages beginning at about 120° F. and ending at 220° F. or higher according to the nature of the particular enamel used. When the record blank is made in the manner described above, I have found that an accurate sound record may be impressed therein regardless of the hardness of the surface material.

While I have illustrated the application of surface coatings to both of the faces of the tablet, it is evident that if desired only one face of the tablet need be coated. Numerous other modifications may be made in the process and also the apparatus above described without departing from the spirit of my invention, the latter being limited only as defined by the terms of the appended claims.

What I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. The process of making tablets for sound records, which comprises placing in a mold a quantity of finely divided stock, pressing the same to a compact mass having a substantially uniform density throughout, evening off the surface of the compacted mass, and compressing the same with the application of heat to form a tablet of desired shape, substantially as described.

2. The process of making tablets for sound records, which comprises placing in a mold a quantity of finely divided stock, forming the same into a compacted mass having a substantially uniform density throughout, evening off the surface of the compacted mass to form a mass of stock of uniform thickness, and compressing the same with the application of heat to form a tablet of desired shape, substantially as described.

3. The process of making tablets for sound records, which comprises placing in a mold a quantity of powdered stock, compressing the same to a compact mass having a substantially uniform density throughout, evening off the surface of the compacted mass with additional powdered stock, and compressing the same with the application of heat to form a tablet of desired shape, substantially as set forth.

4. The process of making tablets for sound records, which comprises placing into a mold a quantity of powdered stock, compacting and forming the same into a mass having an even upper surface and a substantially uniform density throughout, compressing the same with the application of heat to form a tablet of desired shape, and applying to said tablet a veneer of hard incompressible record material, substantially as set forth.

5. The process of making record tablets which comprises placing into a mold a quantity of powdered material which is plastic when hot and hard when cold, compacting and forming the same into a mass having a comparatively even upper surface and a substantially uniform density throughout, compressing the same with the application of heat to form a tablet of desired shape, and applying to said tablet a veneer of material which becomes slightly softened but not sufficiently plastic to flow when hot, substantially as set forth.

6. The process of making tablets for sound records, which comprises placing in a mold a quantity of powdered stock, compressing the same by means of fluid pressure to a compact mass, evening off the surface of the compacted mass, and compressing the same with the application of heat to form a tablet of desired shape, substantially as set forth.

7. The process of making tablets for sound records, which comprises placing in a mold a quantity of powdered stock, applying a flexible covering to the top of said stock, compressing the latter to a compact mass by the application of fluid pressure to the said covering, evening off the surface of the compacted mass, and compressing the same with the application of heat to form a tablet of desired shape, substantially as set forth.

8. The process of making tablets for sound records, which comprises placing in a mold a quantity of powdered stock, applying a flexible covering to the top of said stock, compressing the latter to a compact mass by the application of fluid pressure to the said covering, evening off the surface of the compacted mass, compressing the same with the application of heat to form a tablet of desired shape, and applying to said tablet a veneer of hard impressible record material, substantially as set forth.

9. The process of making tablets for sound records or the like, which comprises placing in a mold a quantity of powdered stock, applying a yielding covering to the top of said stock, compressing the latter to a compact mass by the application of pressure to said covering, evening off the surface of the compacted mass, and compressing the same with the application of heat to form a tablet of desired shape, substantially as set forth.

10. The process of making tablets for sound records or the like which comprises

placing in a mold a quantity of finely divided stock comprising a filler and a binder therefor, compacting the same to a mass having substantially uniform density throughout, evening off the surface of the compacted mass, and compressing the same with the application of heat to form a tablet of desired shape, substantially as set forth.

11. The process of making tablets for sound records or the like which comprises placing in a mold a quantity of finely divided stock comprising a filler and a phenolic binder therefor, compacting the same to a mass having substantially uniform density throughout, evening off the surface of the compacted mass, and compressing the same with the application of heat to form a tablet of desired shape, substantially as set forth.

12. The process of making tablets for sound records or the like which comprises placing in a mold a quantity of finely divided stock comprising a filler and a binder therefor, compacting the same to a mass having substantially uniform density throughout, evening off the surface of the compacted mass, compressing the same with the application of heat to form a tablet of desired shape, and applying a surface veneer to said tablet, substantially as set forth.

This specification signed and witnessed this 19th day of December 1911.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



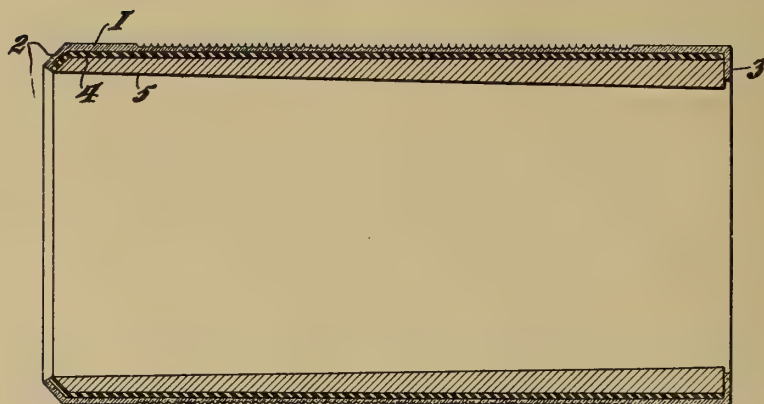
METHOD OF MAKING PHONOGRAPH RECORDS,  
# 1,146,414-----Thomas A. Edison,  
Patented-July 13, 1915.  
Filed- August 27, 1914.

T. A. EDISON.  
METHOD OF MAKING PHONOGRAPH RECORDS.  
APPLICATION FILED AUG. 27, 1914.

1,146,414.

Patented July 13, 1915.

*Fig. 1*



*Fig. 2*



*Witnesses:*

*Jacob Unger*  
*Friedrich Bachmann*

*Inventor:*

*Thomas A. Edison*  
*by Dyer & Holden*

*his Atty.*

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR  
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## METHOD OF MAKING PHONOGRAPH-RECORDS.

1,146,414.

Specification of Letters Patent.

Patented July 13, 1915.

Original application filed January 20, 1912, Serial No. 672,397. Divided and this application filed August 27, 1914. Serial No. 858,799.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Methods of Making Phonograph-Records, of which the following is a description.

My invention relates to methods of making phonograph records having a surface of wear resisting material, such as celluloid, this application being a division of my application Serial No. 672,397 filed January 20, 1912 and entitled Phonograph records.

The object of my invention is to provide a record of the type referred to permitting the reproduction of the sound record formed thereon with distinctness, loudness and purity. It has been common to provide records with surface films or veneers of hard materials such as celluloid; but the reproduction from these records has usually been accompanied by harsh unpleasant scratchy sounds which I have discovered to be due to the fact that the record surface is hard and unyielding so that the reproducer strikes the bottom of the record groove with a more or less sharp blow. In order to overcome this and other objections and at the same time provide a wear resisting surface for the record, I construct my improved record of a flexible or yielding surface film or veneer of hard material, such as a thin sheet of celluloid, and provide a resilient or yielding backing therefor, this backing being in my preferred construction formed of a base of hard material, such as plaster of Paris, and a thin film or layer of resilient material such as rubber, intermediate said surface veneer and base. The resilient material should be a substance, such, for example, as rubber, which yields but is not liable to permanent deformation under the pressure of the reproducer stylus. The resiliency of the intermediate film or layer permits a slight flexing or yielding of the surface film or veneer under the reproducer so that the sharp blows of the reproducer are cushioned and the harsh noises above referred to eliminated; while the rigidity of

the base prevents a diminution of the amplitude of the sound waves as reproduced, so that the sound waves on the record surface are transmitted with full amplitude to the reproducer diaphragm. It is understood that the intermediate film above referred to yields only sufficiently to permit the cushioning of the stylus so as to eliminate the harsh sounds referred to above.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which—

Figure 1 represents a central vertical sectional view of a cylindrical sound record embodying my invention; and Fig. 2 represents a similar view of a disk sound record embodying my invention.

Referring to the drawings and more particularly to Fig. 1, the reference numeral 1 indicates a cylinder of hard material such as celluloid, this cylinder being formed at its ends with inwardly directed flanges 2 and 3. The cylinder 1 is covered on the interior thereof with a thin coating 4 of resilient material, such as rubber, this coating being preferably applied by rotating the cylinder 1 and applying a solution of the resilient material, as with a brush, to the interior or bore of the cylinder. When rubber is used, I prefer to employ a solution of the same in benzol. After the layer or film 4 has been allowed to dry, I form on the interior thereof, as by casting, a backing 5 of hard unyielding material, such as plaster of Paris. In carrying out the casting operation in practice, I place within the coated cylinder 1 a core having a recess or groove opening at one end and in the lateral surface of the core, and pour the material to be cast into this recess or groove, from which it is led into the annular space between the core and the film 4. The base 5 is dried by placing the record within an oven, after which the record may be reamed and otherwise suitably finished. In practice, the core is preferably slightly withdrawn before the base 5 is dried so as to prevent the forma-



tion of an objectionable projection within the bore of the record at the place where the recess in the mold is located. The flanges 2 and 3 are preferably of slightly greater diameter than the corresponding ends of the bore of the base 5, the record being supported when in place on the phonograph mandrel entirely by the base 5. The record impression is preferably formed on the surface of the celluloid film 1 prior to the application of the yielding film and the base thereto.

In order to produce best results, the film or veneer 1 should be sufficiently thin to be flexible or yielding and the film 4 should be of such a thickness as to cushion the sharp sudden movements of the reproducer stylus which produce the harsh sounds referred to above without causing such a flexing or yielding of the surface veneer as to appreciably decrease the volume of sound emitted during the reproducing of the record. In practice, I have found that a suitable thickness for the celluloid surface film is about .018" and that a suitable thickness for the intermediate film of rubber is about .0015".

Referring to Fig. 2, the numerals 1', 4' and 5' indicate respectively the hard surface film or veneer, yielding intermediate film, and hard base of a disk record constructed in accordance with my invention. The veneer 1 and film 2, as in the form of my invention described above are preferably formed respectively of celluloid and rubber. For the disk sound records, however, I prefer to provide a base not only of considerable hardness but also of considerable toughness and capable of adhering firmly to the intermediate film. Suitable materials for such a base are hard rubber or the phenolic condensation products which form the subject matter of applications of Jonas W. Aylsworth, Serial Nos. 496,060, 543,238 and 604,982. With the disk record as with the cylindrical record, the record impression should be formed in the surface veneer prior to the application of the flexible film and base thereto. The celluloid for the disk record may be of less thickness than that for the cylindrical record preferably about .005 of an inch in thickness, the yielding film 4' being preferably of substantially the same thickness as the corresponding film in the cylindrical record, *i. e.* about .0015".

I have found in practice that the employment of the yielding intermediate film referred to above not only improves the quality of the record but also decreases the wear of the stylus on the record and thereby materially increases the life thereof, the hard unyielding base preserving the loudness and distinctness of the record.

Various materials other than those specified above may be used by me and numerous

other modifications may be made within the scope of my invention.

What I claim as new and desire to protect by Letters Patent is as follows:

1. The process of making record tablets which comprises forming a surface veneer of hard material, applying to the back of said veneer a coating of resilient material, and allowing the same to dry, substantially as described.

2. The process of making record tablets which comprises forming a celluloid surface veneer, applying to the back of said veneer a coating of resilient material, and allowing the same to dry, substantially as described.

3. The process of making record tablets which comprises forming a thin surface veneer of hard material, applying to the back of said veneer a coating of rubber, and allowing the same to dry, substantially as described.

4. The process of making record tablets which comprises forming a thin celluloid surface veneer, applying to the back of said veneer a coating of rubber, and allowing the same to dry, substantially as described.

5. The process of making record tablets which consists in forming a thin surface veneer of hard material, applying to the back of said veneer a coating of resilient material, allowing the said coating to dry, and providing the coated veneer with a base of hard unyielding material, substantially as described.

6. The process of making record tablets which consists in forming a thin surface veneer of hard material, applying to the back of said veneer a film of resilient material, and casting a hard unyielding base within the said film, substantially as described.

7. The process of making record tablets which consists in forming a thin surface veneer of hard material, applying to the back of said veneer a coating of resilient material, allowing the said coating to dry, and casting a hard unyielding base within the coated veneer, substantially as described.

8. The process of making record tablets which consists in forming a thin tube of hard material, applying to the bore of said tube a coating of resilient material, allowing the said coating to dry, and casting a hard unyielding base within the coated tube, substantially as described.

9. The process of making record tablets which consists in forming a thin tube of hard material having inwardly directed flanges, applying to the base of said tube a coating of resilient material, allowing the said coating to dry, and casting a hard unyielding base within the coated tube, substantially as described.

10. The process of making record tablets

which consists in forming a thin tube of  
celluloid, applying to the base of said tube a  
coating of resilient material, allowing the  
said coating to dry, and casting a hard un-  
5 yielding base within the coated tube, sub-  
stantially as described.

This specification signed and witnessed  
this 26th day of August, 1914.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,

MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."





PHONOGRAPH,

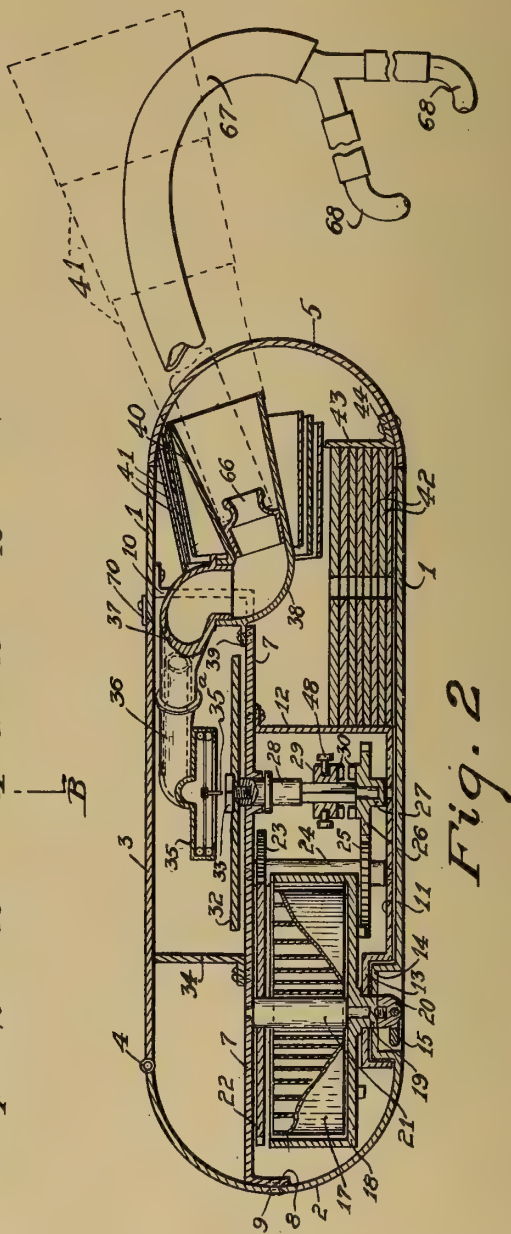
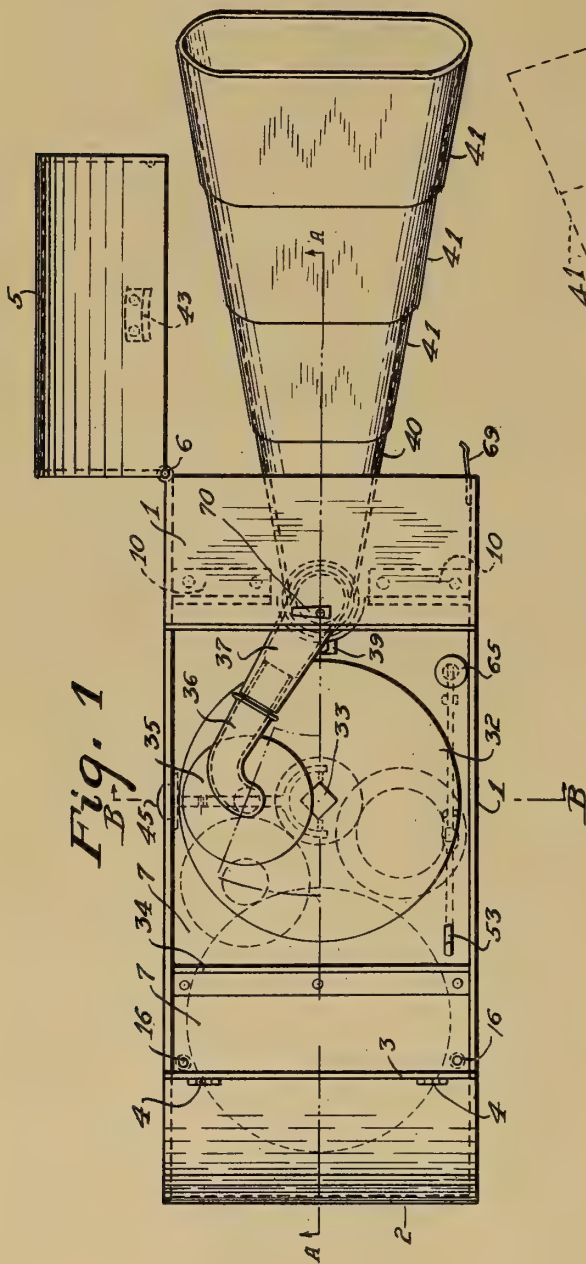
#1,146,418-----Hzl Fuller,  
Patented-July 13, 1915.  
Filed-February 24, 1913.

APPLICATION FILED FEB. 24, 1913.

**1,146,418.**

Patented July 13, 1915.

2 SHEETS—SHEET 1.



## Witnesses

W.C. Brickett

Normie Helsh.

Inventor

*MZL Fuller.*

By

Robt Johnston M

Attorney





MZL FULLER.  
PHONOGRAPH.

APPLICATION FILED FEB. 24, 1913.

1,146,418.

Patented July 13, 1915.

2 SHEETS—SHEET 2.

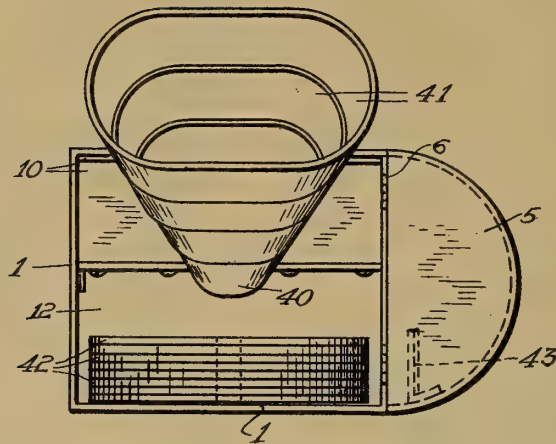


Fig. 3.

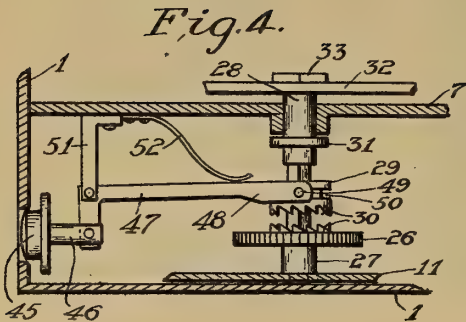


Fig. 4.

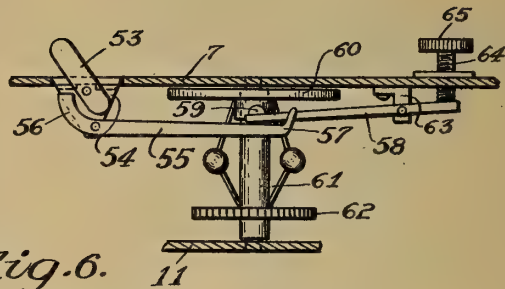


Fig. 5.

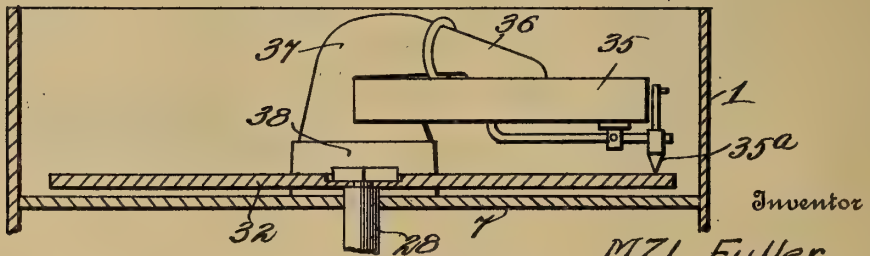


Fig. 6.

Witnesses

W.C. Prickett  
Ronald Welch.

By

MZL Fuller  
Ralph Johnston  
Attorney

# UNITED STATES PATENT OFFICE.

MZL FULLER, OF BIRMINGHAM, ALABAMA.

## PHONOGRAPH.

1,146,418.

Specification of Letters Patent.

Patented July 13, 1915.

Application filed February 24, 1913. Serial No. 750,240.

*To all whom it may concern:*

Be it known that I, MZL FULLER, a citizen of the United States of America, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to improvements in phonographs, or sound recording and reproducing apparatus, and its object is to simplify, lighten, and condense the apparatus so that it may be embodied in a small, compact and portable structure which can be conveniently carried in the pocket.

My present invention is especially adapted for use in connection with other inventions of mine, the object of all of which is to make it possible to conveniently and cheaply produce small, light records and reproduce from the same so that such records may be transmitted through the mails and interchanged to form a part of business and personal correspondence.

With such an end in view, one important thing is to so simplify and cheapen the means of making and reproducing the records that they can be made generally accessible, and that is the object primarily in view in my present invention which involves novel features in the construction of the casing or container for the recording apparatus; the tone arm and manner of mounting the same and attaching the sound box thereto; the arrangement and construction of the sound amplifying means; the manner in which the operating mechanism is detachably mounted in the container; and the provision for carrying a number of record disks in the phonograph casing.

These and other features which constitute my present invention are hereinafter more fully described and claimed, the same being illustrated in their preferred embodiment in the accompanying drawings, in which:—

Figure 1 is a top plan view of the phonograph mechanism with the end and top doors open and the amplifying horn extended and the sound box in its extreme inner position with its recording needle or stylus near the center of the turn table. Fig. 2 is a longitudinal cross-sectional view along the line A—A of Fig. 1, with the end door closed and the horn collapsed. Fig. 3 is a front elevation of Fig. 1. Fig. 4 is a detail view of the mechanism for stopping the

record platform. Fig. 5 is a detail view of the mechanism for regulating and stopping the motor. Fig. 6 is a detail view taken on the line B—B of Fig. 1, showing the sound box in starting position.

Similar reference numerals refer to similar parts throughout the drawings.

My preferred form of casing is a light metal box 1 having a rounded end 2 and a top, vertically-opening door 3, which extends preferably across the entire width of the top and is hinged at 4. The other rounded end 5 of the casing forms a door which is hinged to the casing at one side by a hinge 6. The box is adapted to have inserted through its end door a metal frame in which the motor and the control mechanism are mounted. This frame comprises a top plate 7, the inner end of which is flanged at 8 and connected by screws 9 to the inner wall of end 2 of the box. The outer end of the plate extends beyond the opening for door 3 and is bent upwardly and flanged at 10 where it is fastened by screws to the top of the box. The bottom plate 11 of the frame likewise fits snugly in the box and has a vertical transverse end wall 12 which is flanged at its top and fastened to the underside of plate 7. Near its other end this plate has a socket 13 provided therein which is adapted to fit over a corresponding countersunk socket 14 formed in the bottom of the box and intended to receive the hinged finger piece 15 by which the motor is wound. The bottom plate at each side of its left hand end (Fig. 1) is rigidly braced to the top plate by rivet pins 16. The general motor and control mechanism is mounted between the plates 7 and 11 and though the same does not form a part of my present invention, it may be briefly and formally described as comprising a main spring 17 seated in a ratchet casing 18 which has a central depending boss 19. This boss is adapted to fit down through central alining openings in the sockets 13 and 14 and has a threaded end on which a sleeve 20 is screwed, the winding finger piece 15 being pivoted to it. The spring driven arbor 21 has its bearings in the top plate 7 and boss 19 and at its upper end has rigid thereon a gear wheel 22 which drives a gear 23 fast on an arbor 24 which has bearings in the plates 7 and 11. A second gear 25 on the latter arbor meshes with a gear wheel 26 which has a socketed boss



27, the lower end of which is turned to fit as a bearing in plate 11. A shaft 28 has its lower end rounded and seated to turn in the socket in gear 26, and its middle portion is squared to receive a sliding clutch member 29. The gear 26 and member 29 have teeth 30 (Fig. 4) adapted to interlock and cause shaft 28 to turn with gear 26. The shaft is provided with a collar 31 which engages the bottom edge of an annular flange surrounding a central opening in the plate 6 through which the top of the shaft projects and has a top threaded socket.

A turn table 32 is seated on the top of the arbor 28 and is held in position thereon by a screw 33 which passes down through the central opening in the turn table and is screwed into the top of the shaft. This central screw is provided with a square head which projects above the turn table but its head may be rounded if desired. The turn table leaves but a slight clearance between it and the sides of the box. The compartment in which the platform turns is divided off from the ends of the box by the upturned end of the plate 7 on one side and by a vertical partition 34 on the other, which partition extends transversely across the casing and has its bottom flange screwed to the plate 7. This partition extends up to the level of the door 3 and forms between it and the end 2 of the box a compartment which is accessible when the door 3 is open and which is adapted to receive the needles and small detachable parts of the apparatus.

All of the operating mechanism, thus fully described, is adapted to be readily inserted in the open end of the box and to be easily detached and withdrawn therefrom when repairs are required.

The sound reproducing and recording means are especially designed and arranged for being located within the small space which is provided therefor in the box. This mechanism comprises a sound box 35 of any standard construction having the customary arrangement of diaphragm and receiver for the recording stylus or reproducing needle 35<sup>a</sup> which is disposed at the edge of the diaphragm shown at its inner position near the center of the turn table in Fig. 1. This sound box is disposed in horizontal position above the turn table as by this arrangement it requires about one-half of the vertical space which would be required for it if it were disposed in the customary vertical manner.

In order to enable the sound box to be turned up for changing needles, I connect to it at its center a tubular elbow 36, the inner end of which elbow extends radially and horizontally over the sound box nearly to its outer edge and is then bent horizontally at right angles and reduced to form a sleeve which will fit snugly in a socket there-

for formed in the pivoted swinging tone arm 37. The long axis of the tone arm and elbow will pass over the sound box at a distance from its edge, diametrically opposite the needle point, which is slightly greater than the distance the under face of the sound box is spaced from the record. This arrangement permits the sound box when turned about the said long axis, to clear the record, and but for this arrangement it would be necessary to space the sound box from the record the distance of a radius of the box. This tone arm 37 has a downturned end which partly projects through the vertical extension of the plate 7 at the transverse center of the box and fits in a tubular elbow 38 which is set into a recess cut away therefor in the top plate 7 and in its vertical end wall, the elbow having a flange 39 which is bolted to the plate 7 and holds the elbow firmly in position. The tone arm 37 makes a joint with the elbow 38 which permits it to turn freely therein about a vertical axis and to permit the sound box to swing to the position shown in Fig. 1 with its needle near the center of the turn table after traversing the grooved surface of the records. The outer end of the elbow 38 terminates in an upwardly inclined flaring extension 40 which is preferably formed oblong in cross section with its greatest width in the transverse plane of the box. This extension 40 forms the inner or base member of an extension horn comprising a series of telescoping members 41 which gradually enlarge, as will be seen by reference to Figs. 1 and 2, and which are also oblong so as to provide the maximum size horn which can be fitted into the available oblong space in the open end of the box. It will be noted that the inclined position of the extension 40 causes the horn to project upwardly in convenient position when the phonograph rests on a table or is carried in the hand, for delivering the magnified sound from the sound box and also in the most convenient position to receive the voice when the instrument is used to reproduce sounds. It will be noted that the manner in which the sections 36 and 37 of the tone arm are joined permits the section 36 to be swung on a horizontal axis and to turn the sound box to present the needle or stylus in position for removal or inspection.

It will be evident from the shape and size of the box in the form illustrated that it has been designed and intended to be carried in the pocket, though obviously the general principles of construction are applicable to the larger types of apparatus.

In the pocket type it is particularly desirable to arrange the phonograph to carry a number of record disks and to this end I have arranged space for such records in the horn chamber formed between the vertical



wall 12 of the bottom plate 11 and the end door 5 of the box. As seen in Figs. 2 and 3, these record disks 42 are located below the horn members in their collapsed position and are adapted to be engaged at their outer ends by a curved holder 43 which is flanged at 44 and bolted near the lower edge of the door 5 at its center. The oblong shape of the horn lends itself especially to making provision for this storage space for the record disks.

In the pocket phonograph it is also especially desirable that the control means be so positioned that the box can be held in the hand of the operator and the several levers controlled by the fingers of the hand that holds the box. To this end control devices are provided on both sides of the box near the center. One control arrangement is that intended to temporarily disconnect the record supporting turn table without stopping the motor drive, the object being to permit the record to be cut in again at full speed, which is particularly desirable in dictation work. To this end I provide a push button 45 which projects through one side of the box and has a shank 46 which is connected to one arm of a bell crank lever 47, the other arm of which is provided with a yoke 48 having pins 49 which work in a groove 50 in the upper clutch member 29. A bracket bearing 51 for the bell crank is bolted to the underside of the plate 7 and a spring 52 is likewise connected to that plate and engages the bell crank near its yoke 48, tending to urge the clutch member 29 to interlock with the lower clutch element and also to hold the button 45 in its outer position. In other words the turn table is normally held in driving connection with the motor driven gear wheel 26. On the opposite side of the box is provided a pivoted button or arm 53, the upper end of which projects up through and above the plate 7 and is pivoted near its lower end in a depending plate 54, the upper end of which is rigidly attached to the plate 7 and the lower end of which has pivotally connected to it a horizontal lever 55. This lever has an upturned rounded end 56 which is adapted to be engaged and rocked by the inner end of the button 53 when pushed to the right from its position in Fig. 5. At its other end the lever 55 is bifurcated at 57 and between the bifurcations is adapted to receive an end of lever 58, which is provided with a button 59. When raised this button is adapted to frictionally engage a disk 60 mounted on the governor shaft 61 which is driven by a gear 62 that meshes with the gear 26. The lever 58 is pivoted to a bracket 63 and its end beyond the pivot is adapted to be engaged by a set screw 64 having a mill head 65 which is screwed down through the top plate 7 and is adapted to control the frictional engagement between parts 59 and

60 to regulate the speed of the apparatus. When the button 53 is thrown to the right, the lever 55 is rocked thereby to cause the lever 58 to immediately stop the operation of the motor. I provide the extension 40 with a nipple 66 which is designed to receive the inner end of a tube 67 which carries the ear pieces 68. Provision is thus made for either form of sound amplifying or condensing means.

Any suitable catch means such as the spring catch 69 is carried by the box and adapted to hold the door 5 in its closed position. A pivoted spring clip 70 serves to hold the door 3 in its closed position.

In operation, after the operating mechanism has been inserted into and fastened in box 1, the door 3 is raised and a record is placed on the turn table 32 with its center opening fitting over the head 33. The tone arm is adjusted from its inner position shown in Fig. 1 where its needle or stylus 35<sup>a</sup> is near the center of the record to its starting position with its needle or stylus located at the outer edge of the record, as seen in Fig. 6. The end door 5 is then opened and the horn adjusted to its extended position, the button 53 is pressed to release the motor and the reproducing or recording operation takes place. New needles are inserted by swinging the tone arm 36 on its horizontal axis to bring the sound box 35 up into position where the needle or stylus can be inspected and removed.

The shape and arrangement of the tone arm and its elbow 38 are such that the whole phonographic apparatus can be condensed into a very small space without at all interfering with its normal and satisfactory operation.

The peculiar construction of the amplifying horn is best adapted for either receiving or giving out the sounds when the apparatus is lying flat on any suitable support.

The construction permitting the sound box to operate in a horizontal position with the needle at its edge is important in that it materially reduces the vertical height of the case and permits the casing to be made just wide enough to receive the turn table 32. The record disks before and after use can be conveniently stored in the box 1, which thus affords a very complete and compact phonographic equipment which can be produced in pocket size and conveniently transported.

What I claim as new and desire to secure by Letters Patent, is:—

1. In a phonograph apparatus, an oblong casing having top and end doors, a motor driven sound reproducing apparatus disposed in one end thereof under said top door, a sound conductor leading from said apparatus toward the other end of the casing, a collapsible sound amplifying means



normally disposed within the other end of the casing between said conductor, to which its innermost member is attached, and said end door, said means being adapted, when expanded, to project through the end opening of said casing, as and for the purposes described.

2. In a phonograph, in combination, an oblong pocket size casing divided transversely by a vertical partition into two compartments, one having a top door and the other an end door, a motor driven sound reproducing apparatus in the first mentioned compartment, a tone arm leading therefrom into said other compartment, and a collapsible horn mounted on said tone arm in position to be housed in said other compartment when collapsed and when expanded to project through the open end door thereof, substantially as described.

3. In a phonographic apparatus, an oblong pocket size casing having at one end a sound reproducing mechanism including a tone arm and sound box, a transverse intermediate partition, a sound amplifying means in the other end of the casing, said means comprising a tubular elbow which is mounted in and projects through said partition, having its inner end connected to the tone arm of said mechanism and having a flaring oblong vertically inclined outer end which projects substantially to the end of the casing, a door to close said end of the casing, and a series of collapsible oblong members which fit over said flaring end of the elbow and when expanded form therewith a vertically inclined horn which projects through and beyond the casing.

4. A phonograph comprising, in combination, sound reproducing and recording mechanism, a casing therefor having an end door, an end chamber which is closed by said door, and a collapsible sound magnifying horn having its innermost member connected to said mechanism and disposed in said chamber, which completely houses said horn when collapsed on said member, said horn being adapted to be drawn out through said open end door and into expanded position.

5. In a portable phonograph, a casing having top and end openings, door means to close said openings, and a sound reproducing machine which is removably mounted in said casing under said top opening and makes a close fit therein except at the casing's open end where space is left to provide a horn and disk record receiving chamber which is accessible through the open end of the casing, and a collapsible horn permanently attached to said machine and disposed in the upper part of said chamber in position to be expanded beyond and collapsed behind the door that closes said end opening, substantially as described.

6. In a portable phonograph, an oblong

casing having substantially the width of the phonograph and having an end door, a phonograph mechanism comprising a motor driven turn table, sound reproducing means and sound amplifying means all mounted in a frame, said casing having an opening over said turn table, said frame having a transverse wall which forms a vertical partition in the casing and separates the sound amplifying means from the reproducing mechanism, said wall having its lower part bent in under the turn table to receive disks to be held in place by said end door when closed, and said amplifying means being connected to and wholly supported by the frame above the disk receiving space, substantially as described.

7. In combination, a rectangular oblong casing open at one end, a metallic frame having mounted therein a complete phonograph mechanism, said frame being insertible through said open end of the casing, means to secure the frame in the casing, and a door for said end opening, said mechanism having attached thereto a collapsible horn which is disposed opposite said opening and above the bottom of the casing to provide a space to receive flat record disks to lie horizontally on the casing bottom, said door having a projection which both engages said disks and supports the loose collapsed horn sections above the disks.

8. In a phonograph of the character described, a horizontally disposed sound box, a tubular elbow connected substantially centrally to the sound box and extending radially thereof and horizontally approximately to its periphery and then being bent in a horizontal plane substantially at right angles, and a horizontally swinging tone arm on the free end of which said elbow is pivotally mounted and adapted to turn to move its angled end in a vertical plane and raise the sound box thereon bodily, said box carrying its recording or reproducing stylus at its side away from said elbow.

9. In a portable pocket sized phonograph, a flat oblong casing having a top door, a motor driven platform exposed below and adjacent to said door, a tone arm adapted to swing horizontally over the platform, an angled tubular extension swiveled in the outer end of the tone arm, a horizontally disposed sound box connected to the end of said extension and disposed relatively to the tone arm so that a vertical axial plane through said arm, when projected, will pass through and to one side of the center of said box, and a reproducing stylus connected to the sound box on the side opposite the tone arm, the distance between the projected center line of the tone arm and the adjacent edge of the sound box being less than the distance between such center line and the platform, substantially as described.



wall 12 of the bottom plate 11 and the end door 5 of the box. As seen in Figs. 2 and 3, these record disks 42 are located below the horn members in their collapsed position and are adapted to be engaged at their outer ends by a curved holder 43 which is flanged at 44 and bolted near the lower edge of the door 5 at its center. The oblong shape of the horn lends itself especially to making provision for this storage space for the record disks.

In the pocket phonograph it is also especially desirable that the control means be so positioned that the box can be held in the hand of the operator and the several levers controlled by the fingers of the hand that holds the box. To this end control devices are provided on both sides of the box near the center. One control arrangement is that intended to temporarily disconnect the record supporting turn table without stopping the motor drive, the object being to permit the record to be cut in again at full speed, which is particularly desirable in dictation work. To this end I provide a push button 45 which projects through one side of the box and has a shank 46 which is connected to one arm of a bell crank lever 47, the other arm of which is provided with a yoke 48 having pins 49 which work in a groove 50 in the upper clutch member 29. A bracket bearing 51 for the bell crank is bolted to the underside of the plate 7 and a spring 52 is likewise connected to that plate and engages the bell crank near its yoke 48, tending to urge the clutch member 29 to interlock with the lower clutch element and also to hold the button 45 in its outer position. In other words the turn table is normally held in driving connection with the motor driven gear wheel 26. On the opposite side of the box is provided a pivoted button or arm 53, the upper end of which projects up through and above the plate 7 and is pivoted near its lower end in a depending plate 54, the upper end of which is rigidly attached to the plate 7 and the lower end of which has pivotally connected to it a horizontal lever 55. This lever has an upturned rounded end 56 which is adapted to be engaged and rocked by the inner end of the button 53 when pushed to the right from its position in Fig. 5. At its other end the lever 55 is bifurcated at 57 and between the bifurcations is adapted to receive an end of lever 58, which is provided with a button 59. When raised this button is adapted to frictionally engage a disk 60 mounted on the governor shaft 61 which is driven by a gear 62 that meshes with the gear 26. The lever 58 is pivoted to a bracket 63 and its end beyond the pivot is adapted to be engaged by a set screw 64 having a mill head 65 which is screwed down through the top plate 7 and is adapted to control the frictional engagement between parts 59 and

60 to regulate the speed of the apparatus. When the button 53 is thrown to the right, the lever 55 is rocked thereby to cause the lever 58 to immediately stop the operation of the motor. I provide the extension 40 with a nipple 66 which is designed to receive the inner end of a tube 67 which carries the ear pieces 68. Provision is thus made for either form of sound amplifying or condensing means.

Any suitable catch means such as the spring catch 69 is carried by the box and adapted to hold the door 5 in its closed position. A pivoted spring clip 70 serves to hold the door 3 in its closed position.

In operation, after the operating mechanism has been inserted into and fastened in box 1, the door 3 is raised and a record is placed on the turn table 32 with its center opening fitting over the head 33. The tone arm is adjusted from its inner position shown in Fig. 1 where its needle or stylus 35<sup>a</sup> is near the center of the record to its starting position with its needle or stylus located at the outer edge of the record, as seen in Fig. 6. The end door 5 is then opened and the horn adjusted to its extended position, the button 53 is pressed to release the motor and the reproducing or recording operation takes place. New needles are inserted by swinging the tone arm 36 on its horizontal axis to bring the sound box 35 up into position where the needle or stylus can be inspected and removed.

The shape and arrangement of the tone arm and its elbow 38 are such that the whole phonographic apparatus can be condensed into a very small space without at all interfering with its normal and satisfactory operation.

The peculiar construction of the amplifying horn is best adapted for either receiving or giving out the sounds when the apparatus is lying flat on any suitable support.

The construction permitting the sound box to operate in a horizontal position with the needle at its edge is important in that it materially reduces the vertical height of the case and permits the casing to be made just wide enough to receive the turn table 32. The record disks before and after use can be conveniently stored in the box 1, which thus affords a very complete and compact phonographic equipment which can be produced in pocket size and conveniently transported.

What I claim as new and desire to secure by Letters Patent, is:—

1. In a phonograph apparatus, an oblong casing having top and end doors, a motor driven sound reproducing apparatus disposed in one end thereof under said top door, a sound conductor leading from said apparatus toward the other end of the casing, a collapsible sound amplifying means



normally disposed within the other end of the casing between said conductor, to which its innermost member is attached, and said end door, said means being adapted, when expanded, to project through the end opening of said casing, as and for the purposes described.

2. In a phonograph, in combination, an oblong pocket size casing divided transversely by a vertical partition into two compartments, one having a top door and the other an end door, a motor driven sound reproducing apparatus in the first mentioned compartment, a tone arm leading therefrom into said other compartment, and a collapsible horn mounted on said tone arm in position to be housed in said other compartment when collapsed and when expanded to project through the open end door thereof, substantially as described.

3. In a phonographic apparatus, an oblong pocket size casing having at one end a sound reproducing mechanism including a tone arm and sound box, a transverse intermediate partition, a sound amplifying means in the other end of the casing, said means comprising a tubular elbow which is mounted in and projects through said partition, having its inner end connected to the tone arm of said mechanism and having a flaring oblong vertically inclined outer end which projects substantially to the end of the casing, a door to close said end of the casing, and a series of collapsible oblong members which fit over said flaring end of the elbow and when expanded form therewith a vertically inclined horn which projects through and beyond the casing.

4. A phonograph comprising, in combination, sound reproducing and recording mechanism, a casing therefor having an end door, an end chamber which is closed by said door, and a collapsible sound magnifying horn having its innermost member connected to said mechanism and disposed in said chamber, which completely houses said horn when collapsed on said member, said horn being adapted to be drawn out through said open end door and into expanded position.

5. In a portable phonograph, a casing having top and end openings, door means to close said openings, and a sound reproducing machine which is removably mounted in said casing under said top opening and makes a close fit therein except at the casing's open end where space is left to provide a horn and disk record receiving chamber which is accessible through the open end of the casing, and a collapsible horn permanently attached to said machine and disposed in the upper part of said chamber in position to be expanded beyond and collapsed behind the door that closes said end opening, substantially as described.

6. In a portable phonograph, an oblong

casing having substantially the width of the phonograph and having an end door, a phonograph mechanism comprising a motor driven turn table, sound reproducing means and sound amplifying means all mounted in a frame, said casing having an opening over said turn table, said frame having a transverse wall which forms a vertical partition in the casing and separates the sound amplifying means from the reproducing mechanism, said wall having its lower part bent in under the turn table to receive disks to be held in place by said end door when closed, and said amplifying means being connected to and wholly supported by the frame above the disk receiving space, substantially as described.

7. In combination, a rectangular oblong casing open at one end, a metallic frame having mounted therein a complete phonograph mechanism, said frame being insertible through said open end of the casing, means to secure the frame in the casing, and a door for said end opening, said mechanism having attached thereto a collapsible horn which is disposed opposite said opening and above the bottom of the casing to provide a space to receive flat record disks to lie horizontally on the casing bottom, said door having a projection which both engages said disks and supports the loose collapsed horn sections above the disks.

8. In a phonograph of the character described, a horizontally disposed sound box, a tubular elbow connected substantially centrally to the sound box and extending radially thereof and horizontally approximately to its periphery and then being bent in a horizontal plane substantially at right angles, and a horizontally swinging tone arm on the free end of which said elbow is pivotally mounted and adapted to turn to move its angled end in a vertical plane and raise the sound box thereon bodily, said box carrying its recording or reproducing stylus at its side away from said elbow.

9. In a portable pocket sized phonograph, a flat oblong casing having a top door, a motor driven platform exposed below and adjacent to said door, a tone arm adapted to swing horizontally over the platform, an angled tubular extension swiveled in the outer end of the tone arm, a horizontally disposed sound box connected to the end of said extension and disposed relatively to the tone arm so that a vertical axial plane through said arm, when projected, will pass through and to one side of the center of said box, and a reproducing stylus connected to the sound box on the side opposite the tone arm, the distance between the projected center line of the tone arm and the adjacent edge of the sound box being less than the distance between such center line and the platform, substantially as described.

10. In combination, a casing having a socket formed by indenting a portion thereof, there being an opening in said socket, a frame carrying a phonograph mechanism  
5 which is insertible into said casing and has a seat which interlocks with said socket portion, a winding stem in said mechanism adapted to project through said opening in the socket, a key to turn said stem, and de-

tachable means to hold the said frame and 10 casing interlocked.

In testimony whereof I affix my signature in presence of two witnesses.

MZL FULLER.

Witnesses:

NOMIE WELSH,

W. C. PRICKETT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



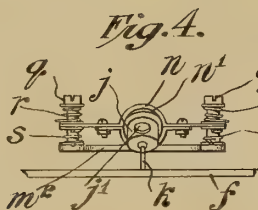
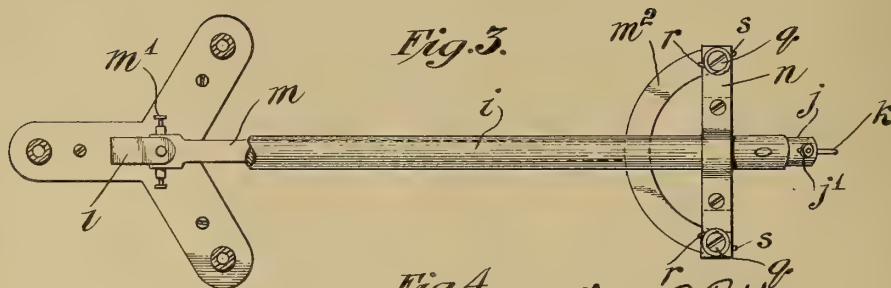
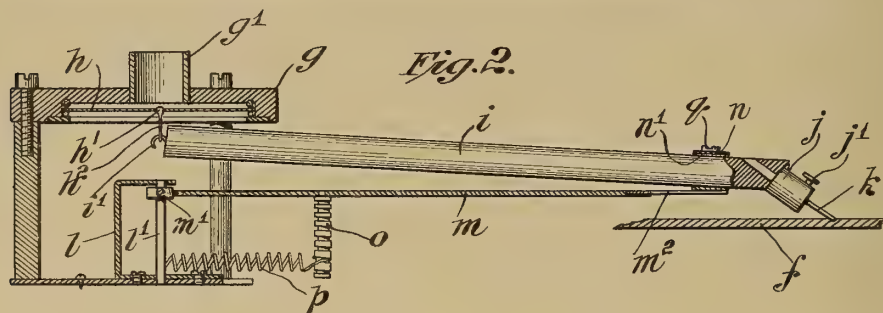
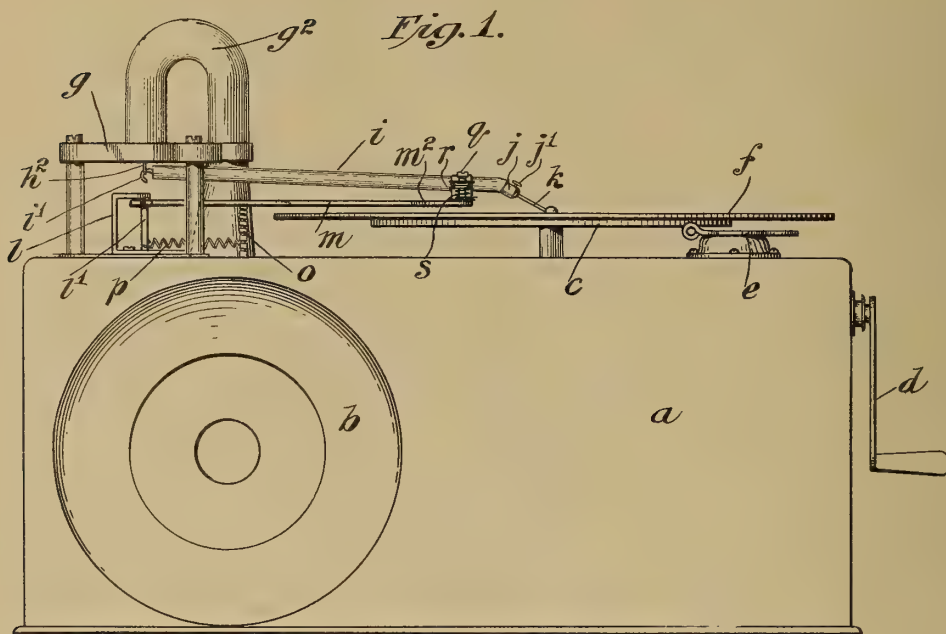


PHONOGRAPH,

#1,146,519-----C. B. Repp,  
Patented-July 13, 1915.  
Filed-December 23, 1910.

1,146,519.

Patented July 13, 1915.



Attest:  
*C. Mitchell*  
*Engene Wering.*

*Clinton B. Repp*  
 Inventor:  
*by Frank P. Wentworth*  
 his Atty.

# UNITED STATES PATENT OFFICE.

CLINTON B. REPP, OF NEW YORK, N. Y.

PHONOGRAPH.

1,146,519.

Specification of Letters Patent. Patented July 13, 1915.

Application filed December 23, 1910. Serial No. 598,940.

*To all whom it may concern:*

Be it known that I, CLINTON B. REPP, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to phonographs and more particularly to the means for transmitting sound vibrations from the record to the diaphragm.

The main object of my invention is to provide a phonograph embodying therein a transmitter or vibrator member without a pivotal support intermediate the ends thereof, the ends of said transmitter or vibrator member being respectively adapted to apply pressure to the diaphragm and to support a producer point, the means applying such pressure permitting said member or arm to be projected over a disk record.

A further object is to provide a phonograph wherein the sound vibrations will be transmitted from the record to the diaphragm through a transmitter or vibrator member and pressure will be exerted upon said arm at a single point to simultaneously tension the diaphragm and cause that intimate contact between the reproducer point and the record which is desirable to induce in said transmitter vibrations corresponding with all of the sound waves indicated upon a record.

A still further object is to provide in conjunction with an apparatus having the characteristics referred to immediately above, means for regulating the pressure exerted by the tensioning member or mechanism.

A still further object is to provide a phonograph of this type wherein the tensioning means will exert a predetermined, proportionate pressure upon the reproducer point and upon the diaphragm.

A still further object is to provide a phonograph of the character described wherein the pressure on the diaphragm may be varied without varying the pressure upon the reproducer point.

A still further object is to provide a phonograph embodying therein a transmitter or vibrator member subjected to pressure acting toward the record and away from the diaphragm, by means of a rigid,

swiveling controlling arm, said transmitter being connected to, or supported from, said controlling arm in a manner to avoid any interference with the vibrations passing through said transmitter or vibrator member, or the presence of a fulcrum about which said member oscillates in following the vertical undulations of the record.

A still further object is to provide a phonograph of this character wherein the volume of reproduced sound may be augmented by merely adjusting the stylus or reproducer point. And a still further object is to provide a phonograph embodying therein a transmitter or vibrator member to which pressure is applied by a rigid controlling rod connected therewith in a manner to avoid interference with the free vibrations of said transmitter or vibrator arm or member, said controlling arm being free to have vertical movement with the undulations upon a record and to have lateral movement to permit the stylus or reproducer point to track in the spiral formed by the indicated sound waves of said record.

The invention consists in the novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—Figure 1 is a side elevation of a phonograph embodying my invention; Fig. 2 is a detailed view, partly in elevation and partly in section, of the sound transmitter and reproducing mechanisms only; Fig. 3 is a plan view of the transmitter or vibrator member and its controlling and supporting arm, one end of said transmitter or vibrator member being broken away to disclose in detail the mechanism thereunder; and Fig. 4 is a front view of the forward end of the transmitter or vibrator member, illustrating the manner of attachment of said member to its controlling arm, and the details of the mount for the stylus or reproducer point.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the accompanying drawings, *a* indicates the casing of an ordinary stand having mounted therein a horn *b*. Rotatably mounted upon the top of this stand is the record table *c* of the usual construction and driven by any desired type of motor not shown. At *d* I have shown the motor wind-



ing crank and at  $e$  the brake or retard member acting on the table  $c$ .

The type of machine shown is especially adapted for use with a disk record, shown at  $f$ , a type of record requiring considerable clearance about the table  $c$  to permit the application of the reproducer point to the record at the proper diameter of the record, and cause the said point to track properly in, and respond properly to, the spiral indicating sound waves.

In my present invention, I use a fixed sound box  $g$  mounted in a frame spaced away from the table  $c$ , which box has an outlet nipple  $g'$  communicating with the horn  $b$  through the U-shaped tube  $g^2$ , a construction permitting the course of the sound waves to be reversed, and their projection into the said amplifier or horn,  $b$ . This construction is preferred and is incidental to that simultaneous tensioning of the diaphragm and the application of pressure to the record, which will be referred to hereinafter.

Mounted in the sound box  $g$  in the usual and well known manner, is a flexible diaphragm  $h$  adapted to have transmitted thereto vibrations as indicated by a record and to develop sound waves corresponding to such vibrations, in the usual and well known manner. This diaphragm, to secure sensibility and avoid residuary vibrations, is placed under a constant and substantially uniform tension by pressure or stress applied thereto through the stud  $h'$  mounted axially thereof.

Those sound vibrations resulting in the development of sound waves by the diaphragm are transmitted to said diaphragm through the vibrator member  $i$ , preferably composed of a close grained wood, or one having substantially no grain, such as bass wood, the transmission of the vibrations being through the body of this member as distinguished from the mechanical oscillations of the member about a fulcrum or pivots intermediate the stylus or reproducer point and the diaphragm, which is the construction now commonly used. I have found in practice that the employment of a wooden member, such as I have described not only results in the transmission with accuracy of all of the sound waves indicated upon the record, but in such transmission in a manner to avoid the presence of cross vibrations due to secondary vibrations set up in the member by the primary vibrations passing along same. This results in purity and softness in the reproduced tones or sounds, avoiding all of those blasts or overtones common in phonographs.

One end of the vibrator or transmitting member  $i$  carries a metallic open loop  $i'$  adapted to pass through and engage a loop  $h^2$  connected with the stud  $h'$ , which loop  $h^2$  forms a part of the conducting system

for the sound vibrations. Preferably it is composed of a silken cord or thread and is itself placed in tension through the same pressure or stress resulting in the tensioning of the diaphragm. This construction not only permits the sound vibrations to be transmitted to the diaphragm but also permits the vertical and lateral oscillations of the vibrator or transmitter member  $i$  in following the vertical undulations and the spiral trend of the indicated sound waves on the record.

Rigidly secured to the free end of the member  $i$  is a metallic mount  $j$  which projects downwardly and forwardly of said member to give the proper line of projection to the stylus or reproducer point  $k$ , secured in said mount by means of an axial opening therein and a set screw  $j'$  carried thereby. This construction not only permits the substitution of a fresh point at any time, but also permits the regulation of the extent of projection of the point with a resultant variance in the pressure thereof upon the record and increase in the intensity of the sound vibrations and the volume of reproduced sound.

To secure that pressure or stress required to tension the diaphragm and secure the requisite intimate contact of the point  $k$  with the record, it is essential that this pressure be applied through the vibrator or transmitter member  $i$  in a manner to avoid the presence of a fulcrum along the length of said member and to eliminate any possibility of interference with the vibrations passing through said member to the diaphragm.

In carrying out my invention, I provide a frame  $l$  in which is mounted by means of a universal joint, a supporting or controlling arm  $m$  extending radially of the diaphragm immediately below the member  $i$  which arm is preferably composed of flat metal stock. The universal joint above referred to consists of a vertical pivot  $l'$  alined with the axis of the diaphragm  $h$ , which pivot is straddled by the forked end of the arm  $m$  and has point bearings formed therein coöperating with pivot screws  $m'$  carried by the member  $m$ , the axis of said pivot screws being perpendicular to the axis of said pivot  $l$ . This universal joint transmits the movement of the arm  $m$  in any direction and thus also permits the vibrator or transmitter member  $i$ , under the control of the record and said arm, to have that lateral traverse necessary during the reproduction of sound from a disk record.

The outer end of the arm  $m$  is provided with a yoke  $m^2$  on the divergent arms of which is mounted a split collar plate  $n$  encircling the member  $i$  adjacent to the mount  $j$ . That portion of the plate  $n$  inclosing the member  $i$  is provided with a flexible pad  $n'$  to prevent the transmission of vibrations



from said member to said collar, said plate being made in two sections to facilitate its application to, or removal from said member.

5 Pendant from the arm  $m$  intermediate the pivot  $l'$  and the yoke  $m^2$ , and nearer the former, is a post  $o$  having the two-fold function of serving as a rest for the transmitter to prevent the engagement of the stylus  $k$  with  
10 the table  $c$ , and as an offset connection for the spring  $p$  to secure leverage in the application of the power exerted by said spring in imparting the requisite pressure through said arm upon the transmitter member  $m$ .  
15 The other end of the spring  $p$  is attached to the pivot  $l'$  although, if desired, it may be attached at any other point in substantial alinement with the axis of said diaphragm.

To permit a variance in the pressure upon  
20 the diaphragm and stylus or reproducer point, I provide the post  $o$  with graduated notches, as shown in the drawings, thus permitting the variance of the leverage at which said spring acts, with a resultant increase of  
25 diminution of the pressure. This adjustment permits the machine to be adapted for either parlor or concert use by a mere adjustment of the tension of the diaphragm and the pressure on the record.

30 In phonographs, it is desirable, in order to minimize wear upon the record, to apply only sufficient pressure to the stylus or reproducer point to insure the required constant intimate contact between said point  
35 and the record, and in that machine made the subject matter of this application, I prefer to embody supplemental adjustment means whereby the tension on the diaphragm exerted by the spring  $p$  may be increased or  
40 diminished without varying the pressure on the stylus or reproducer point caused by said spring. To accomplish this result, I mount the plate  $n$  upon the yoke  $m^2$  by means of adjustable screws  $q$ , spiral springs  
45  $r$  being interposed between the head of said screws and the plate  $n$  and spiral springs  $s$  being interposed between the plate  $n$  and the yoke  $m^2$ . These springs encircle the screws  $q$ , and the lower free ends of the  
50 springs  $r$  bear upon the rear edge of the plate  $n$ , while the lower free ends of the springs  $s$  bear upon the forward edge of the yoke  $m^2$  so that the tensioning of these springs will result in a tilting action of the  
55 plate  $n$  as to the edge thereof toward the diaphragm  $h$ , thus resulting in the application of supplemental pressure upon said arm toward said diaphragm, the pressure upon the stylus or reproducer point  $k$  not being modified in any way by this action.

60 By the construction herein described, I am not only enabled to reproduce sound waves with a stationary diaphragm, but am enabled to arrange the diaphragm in a disk machine upon a plane parallel with the

plane upon which the record rotates, and am thus enabled to simultaneously apply pressure to the record and to the diaphragm through the same agencies.

The operation of the herein described device is substantially as follows:—The table  $c$  is set in motion in the usual and well known manner, and the point  $k$  brought into engagement with the indicated sound waves upon a disk record by raising the vibrator  
70 or transmitter member and swiveling it and its controlling arm  $m$  about the axis of the diaphragm and the pivot  $l'$ . The movement of the record causes the indicated sound waves thereon to impart to the vibrator or  
75 transmitter member  $i$  sound vibrations corresponding in number and frequency to those indicated upon the record. The slight up and downward movement, or vertical oscillation of the member  $i$  is about an axis  
80 fixed axially below the diaphragm, so that any vibrations passing to the diaphragm must be independent of this up and down movement. These vibrations must therefore  
85 pass through the member  $i$  and the tension member  $h^2$  to the diaphragm which at all times is subjected to constant pressure as determined by the tension of the spring  $p$  or by such tension supplemented by that of the  
90 springs  $r$ — $s$ . This pressure being applied to the diaphragm through the member  $i$ , not only results in a sound conductor system, all parts of which are synthesized, but also results in a constant tendency of the diaphragm to return to normal, thus eliminating  
95 residuary vibrations in said diaphragm and limiting the flexure thereof to correspond only with the vibrations passing thereto through the members  $i$  and  $h^2$ . A diaphragm so tensioned is very sensitive and is  
100 responsive to minute vibrations, thus causing the reproduced sound waves to more nearly conform in quality and character of tone, with those sounds which are reproduced  
105 upon the record.

If it be desired to increase or diminish the volume of the sound waves reproduced, the point of engagement of the spring  $p$  with the post  $o$  may be lowered or raised to simultaneously increase or decrease the pressure  
110 upon both the stylus or reproducer point and the diaphragm. If the pressure upon the stylus or reproducer point has reached the maximum consistent with the minimum of wear upon the record, and it be desired  
115 to still further increase the volume of reproduced sound waves, the angle of the downward projection of the member  $i$  may be decreased by tensioning the springs  $r$   $s$ , with a resultant increase in the tension of the diaphragm  $h$ , or if desired the extent of projection of the stylus or reproducer point may be increased or diminished by adjusting it  
120 in its mount  $j$  with a similar variance in the volume of the reproduced sound waves.  
125  
130



As heretofore stated, the member  $i$  in following the record, rotates in its entirety about the strand  $h^2$ , the flexibility of which permits this movement of said arm, the position of said arm relative to the diaphragm and the record being controlled by the member  $m$  which has universal movement to permit the free movement of the member  $i$ .

The springs  $r-s$  are provided with flexible washers which in conjunction with the pad  $n'$  not only prevent the transmission of vibrations, passing through the member  $i$ , to the said springs and to the arm  $m$ , but also prevent the sympathetic vibrations in any parts of the machine other than the said members  $i$  and  $h^2$  and the said diaphragm.

I have found in actual practice that the construction herein described results in a machine running so smoothly as to avoid the development of practically all sounds except those emanating from the diaphragm, much of that scratching and most of those blasts, found in the ordinary phonograph, being entirely eliminated.

It is not my intention in this application to claim broadly a system in phonographs including a tensioned diaphragm and a non-pivotal transmitter member, such having been made the subject matter of another application of mine pending concurrently herewith.

Having described my invention what I claim as new and desire to have protected by Letters Patent is:—

1. In a phonograph, means movably supporting a record, a diaphragm, a vibrator or transmitter member, one end of which is connected with said diaphragm and the other end of which carries a stylus or reproducer point, a controlling arm, one end of which is universally mounted in axial alinement with the axis of said diaphragm and the other end of which is connected to, and movable with said vibrator or transmitter member at a point intermediate the ends thereof, and means exerting constant, substantially uniform pressure upon said arm whereby pressure is applied to said arm to simultaneously tension said diaphragm and press said stylus or reproducer point upon the record.

2. In a phonograph, means movably supporting a record, a diaphragm, a vibrator or transmitter member, one end of which is connected with said diaphragm and the other end of which carries a stylus or reproducer point, a controlling arm, one end of which is universally mounted in axial alinement with the axis of said diaphragm and the other end of which is connected to, and movable with, said vibrator or transmitter member at a point intermediate the ends thereof, a pendent post carried by said arm, and a spring extending from said post to a point below said diaphragm whereby a

constant, substantially uniform pressure is applied to said arm to simultaneously tension said diaphragm and press said stylus or reproducer point into intimate contact with the record.

3. In a phonograph, means movably supporting a record, a diaphragm, a vibrator or transmitter member, one end of which is connected with said diaphragm and the other end of which carries a stylus or reproducer point, a controlling arm, one end of which is universally mounted in axial alinement with the axis of said diaphragm and the other end of which is connected to, and movable with, said vibrator or transmitter member at a point intermediate the ends thereof, a pendent post carried by said arm, and a spring extending from said post to a point below said diaphragm whereby a constant, substantially uniform pressure is applied to said arm to simultaneously tension said diaphragm and press said stylus or reproducer point into intimate engagement with the record, said post being provided with means whereby the point of engagement of the spring therewith may be varied to vary the leverage at which pressure is exerted upon said arm.

4. In a phonograph, means movably supporting a record, a diaphragm, a vibrator or transmitter member, one end of which is connected with said diaphragm and the other end of which carries a stylus or reproducer point, a controlling arm, one end of which is universally mounted in axial alinement with the axis of said diaphragm and the other end of which is forked to provide divergent arms adjacent to the stylus or reproducer point, a plate having a collar encircling said vibrator or transmitter member and secured to said forked ends whereby said member is held against rotative movement and said arm and said member act in unison, and means exerting constant, substantially uniform pressure upon said arm whereby pressure is applied to said arm to simultaneously tension said diaphragm and press said stylus or reproducer point upon the record.

5. In a phonograph, means movably supporting a record, a diaphragm, a vibrator or transmitter member, one end of which is connected with said diaphragm and the other end of which carries a stylus or reproducer point, a controlling arm, one end of which is universally mounted in axial alinement with the axis of said diaphragm and the other end of which is forked to provide divergent arms adjacent to the stylus or reproducer point, a plate having a collar encircling said vibrator or transmitter member and secured to said forked ends whereby said member is held against rotative movement and said arm and said member act in unison, adjustable means connecting said



plate with said forked ends whereby said plate may be tilted to vary the angle of projection of the transmitter relative to said arm and said diaphragm, and means exerting constant, substantially uniform pressure upon said arm whereby pressure is applied to said arm to simultaneously tension said diaphragm and press said stylus or reproducer point upon the record.

6. In a phonograph, means movably supporting a record, a diaphragm, a vibrator or transmitter member, one end of which is connected with said diaphragm and the other end of which carries a stylus or reproducer point, a controlling arm, one end of which is universally mounted in axial alinement with the axis of said diaphragm and the other end of which is forked to provide divergent arms adjacent to the stylus or reproducer point, a plate having a collar encircling said vibrator or transmitter member and secured to said forked ends whereby said member is held against rotative movement and said arm and said member act in unison, adjustment screws carried by said fork and passing through said plate, springs interposed between said screws and the top of said plate and between said plate and said fork, said springs encircling said screws, the ends of said springs bearing upon opposite sides of said plate whereby the compression

of said springs under said screws results in a tilting action of said plate under constant pressure, and means exerting constant, substantially uniform pressure upon said arm whereby pressure is applied to said arm to simultaneously tension said diaphragm and press said stylus or reproducer point upon the record.

7. In a phonograph, the combination with a stationary sound box having an outlet opening therein, a tubular member projecting vertically from said sound outlet, and a diaphragm within said sound box, of an incased horn having its inlet adjacent to said sound box, and a rigid tubular U-shaped member, the opposite ends of which are adapted to be respectively detachably connected with said first named tubular member and the inlet of said horn, whereby said last named tubular member may be used to project the sound waves into said incased horn, or may be removed to permit the use of an exposed horn in conjunction with said first named tubular member.

In witness whereof, I have hereunto affixed my signature, in the presence of two witnesses, this 16th day of December, 1910.

CLINTON B. REPP.

Witnesses:

T. T. WENTWORTH,  
P. FRANK SONNEK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



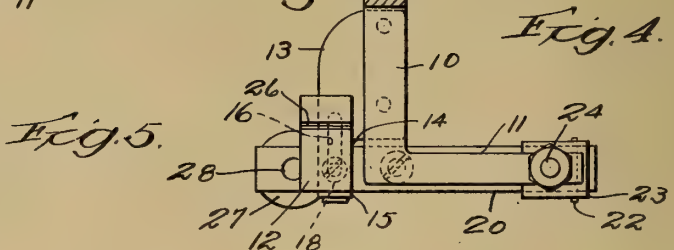
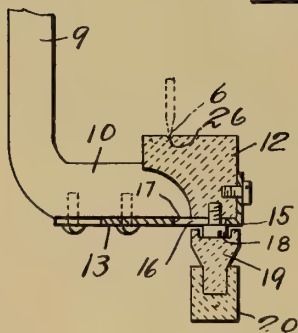
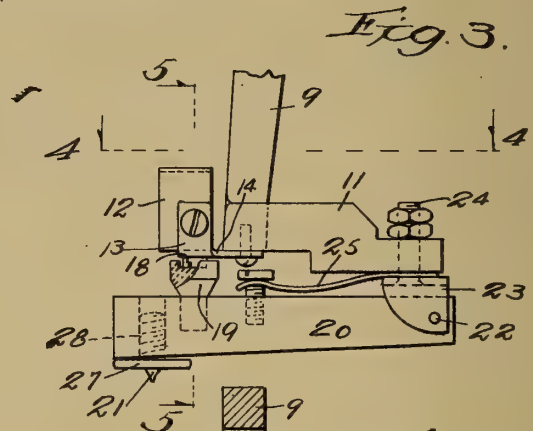
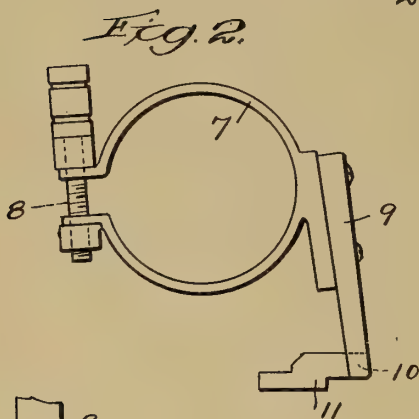
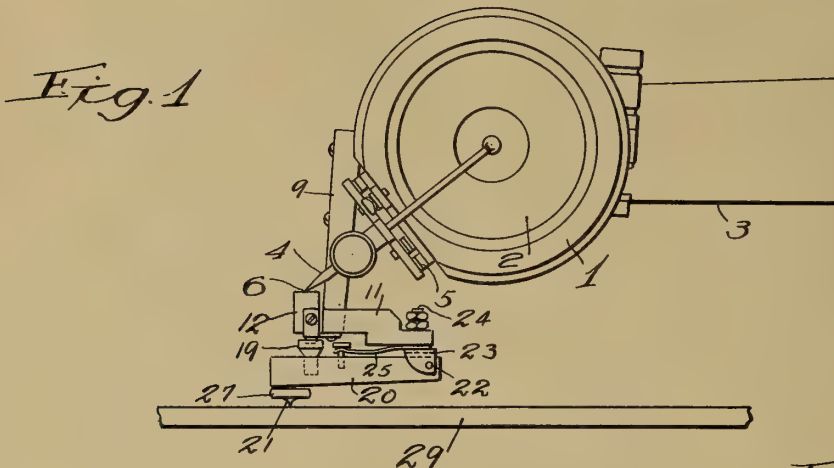
REPRODUCING DEVICE FOR PHOTOGRAPHS,  
#1,146,744-----W. Tures,  
Patented-July 13, 1915.  
Filed-February 17, 1914.



W. TURES.  
REPRODUCING DEVICE FOR PHONOGRAPHS.  
APPLICATION FILED FEB. 7, 1914.

1,146,744.

Patented July 13, 1915.



Witnesses:  
*Ch. Plummer*  
Bessie S. Rice.

Inventor:  
William Tures:  
By *Parker & Carter*  
his Attys.

# UNITED STATES PATENT OFFICE.

WILLIAM TURES, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO HENRY P. BRACE,  
OF CHICAGO, ILLINOIS.

## REPRODUCING DEVICE FOR PHONOGRAPHS.

1,146,744.

Specification of Letters Patent. Patented July 13, 1915.

Application filed February 7, 1914. Serial No. 817,131.

*To all whom it may concern:*

Be it known that I, WILLIAM TURES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Reproducing Devices for Phonographs, of which the following is a specification.

This invention relates to reproducing devices for phonographs and has for its object to provide a new and improved device of this description.

There are two general types of disk phonograph records. In one of these general types of disk records, the needle of the reproducer is moved laterally to vibrate the diaphragm of the reproducer, while in the other general form, the needle is moved up and down to vibrate the diaphragm of the reproducer. This difference in movement of the needle is due to the fact that in the first type mentioned, the record is made by a groove varying laterally, while in the second type, the record is made by a groove varying in depth. Under these conditions, one type of record cannot be played upon the machine adapted for the other type.

One of the objects of my invention is to provide means by which both types of record can be played upon one machine.

Referring now to the drawings, wherein one form of my invention is illustrated; Figure 1 is a side view of a device embodying my invention used in connection with a reproducer for a record having a laterally varying groove, so as to permit said reproducer to be used on a record having a depth varying groove; Fig. 2 is a rear view of the frame or support, adapted to be removably attached to the body of the reproducer; Fig. 3 is an enlarged view of the lower end of the frame shown in Fig. 2, with the groove engaging point and associated parts connected therewith; Fig. 4 is a sectional view taken on line 4-4 of Fig. 3; Fig. 5 is a sectional view taken on line 5-5 of Fig. 3.

Like numerals refer to like parts throughout the several figures.

Referring now to the drawings, I have illustrated in Fig. 1 a reproducer to be used on the type of record having a laterally varying groove, such as a Victor reproducer. This reproducer has the sound box 1 with the diaphragm 2, movably mounted upon

the arm 3 of the machine in any desired manner. The needle 4 is connected at one end to the diaphragm and has the usual pivotal connection at 5 with the casing of the sound box. The point 6 of the needle is adapted to pass along the groove when a record with a laterally varying groove is used, thereby causing the diaphragm 2 to vibrate. When it is desired to use this reproducer with a record having a groove varying in depth, the attachment illustrated in Fig. 1 is fastened thereto. This attachment consists of a frame or support having a clamping part 7, which is preferably a spring part, the ends of which are separated and connected by the screw 8, which may be loosened or tightened to clamp or unclamp the clamping part. Connected with the clamping part is an arm 9, having a laterally projecting part, which is preferably right-angular in shape, having the two branches 10 and 11, see Figs. 2 to 5.

The parts 9, 10 and 11 form a frame or support for the moving parts of the device. Movably connected with this frame is a rocking piece 12. As herein shown, the rocking piece 12 is fastened to a spring piece 13, which in turn is fastened to the branch 10 of the supporting device. The spring piece 13 is cut away at 14, so as to form the comparatively narrow supporting end 15 for the piece, said supporting end having the metal cut away to form the groove 16 to make the spring piece more elastic, so that when pressure is applied to the end 15, the spring piece responds to said pressure and permits the rocking piece to be given the proper motion. Connected with the rocking piece 12 is a projection 18, which in the construction shown is the head of a screw. This projection is received into a hollow receiving piece 19, attached to the vibrating arm 20, carrying the groove engaging point 21. This projection 18 and the hollow receiving piece 19 form a rocking connection between the vibrating arm 20 and the piece 12. The vibrating arm 20 is movably connected to the branch 11 of the support, preferably by universal joint. As herein shown the sound vibrating arm 20 is connected by pivot 22 to a bracket 23, which is movably connected with the branch 11 by the pin 24. The pivot 22 permits vertical movement of the vibrating arm and the pin 24 permits lateral movement of the vibrating arm. A retaining



spring 25 is connected with the vibrating arm and the pin 24 to hold the arm in direct contact with the projection 18 at all times. This retaining spring holds the vibrating arm so that the projection 18 projects into the receiving part 19 when the device is not in use, thus keeping the parts in their proper relation. The point 6 of the needle 4 rests upon the rocking piece 12, said piece being preferably provided with a groove 26 for receiving the point of the needle.

As shown in Fig. 5, the needle 4 engages the rocking piece 12 at one side of its center and said rocking piece is connected at the other side of its center with the vibrating arm 20. The groove engaging point 21 preferably consists of a diamond, garnet or other hard material and when made of a precious stone, the stone may be set in any desired manner, as by means of cement, in the support 27. Said support may be provided with a screw-threaded end 28 by means of which it can be removably attached to the vibrating arm 20. The groove engaging point works in the groove in the record 29.

I have described in detail a particular construction embodying my invention, but it is of course evident that the parts may be varied in many particulars and some of the parts omitted and others used with parts not herein shown, without departing from the spirit of my invention.

The use and operation of my invention are as follows: When it is desired to use a record having a groove varying in depth, the clamping part 7 is clamped upon the sound box 1 and the point 6 of the needle 4 placed in the groove 26 of the rocking piece 12. The groove engaging point 21 is then placed in the groove of the record and the machine started up in the usual manner. The groove engaging point 21 is moved up and down as it moves along the groove in the record, thus causing the arm 20 to vibrate. The vibrations of this arm are conveyed to the rocking piece 12, so as to rock said piece, thereby moving the needle 4 laterally so as to actuate the diaphragm 2 and cause a reproduction of the sound. It will be seen that in this construction the up and down movement of the engaging point is converted into a lateral movement at the point of the needle 4, thereby permitting the reproducer adapted for the records with laterally varying grooves to be used in connection with records having grooves varying in depth.

It will be seen that by the particular construction illustrated, the vibrating arm is free to move up and down and laterally and this movement is not interfered with by connection with the rocking piece, on account of the rocking connection therewith. I have found that by means of this device,

the records having grooves varying in depth may be used with the reproducer of a phonograph adapted for records having laterally varying grooves and that the sounds are reproduced accurately and in all their details, without scratching or unusual noise and that in fact the result produced is greatly superior to the result produced when the reproducer is used on the record with the laterally varying grooves for which it is adapted.

I claim:

1. A reproducing device for phonographs comprising a sound box, a diaphragm, a needle connected with said diaphragm adapted to be vibrated laterally to actuate the diaphragm, a groove-engaging point adapted to be moved up and down, and a connection between said groove-engaging point and said needle making contact with the needle point for converting the up and down motion of the groove-engaging point to lateral movement at the needle point.

2. A reproducing device for phonographs comprising a sound box having a diaphragm, a needle connected with said diaphragm and adapted to move laterally to actuate the diaphragm, a removable support connected with said sound box, a rocking piece connected with said support and upon which the end of said needle is received, a groove-engaging point adapted to engage a record having a groove varying in depth, and a connection between said groove engaging point and said rocking piece by means of which the rocking piece is moved to move said needle laterally.

3. A reproducing device for phonographs comprising a sound box having a diaphragm, an actuating part connected with said diaphragm and adapted to be moved laterally to actuate the diaphragm, a removable support connected with said sound box, a rocking piece movably connected with said support and upon which said actuating part rests, a groove-engaging point adapted to move vertically, a vibrating arm with which said groove-engaging point is connected, and a connection between said vibrating arm and said support and a second connection between said vibrating arm and said rocking piece.

4. A reproducing device for phonographs comprising a sound box having a diaphragm, a needle connected with said diaphragm and adapted to be moved laterally to actuate the diaphragm, a removable support connected with said sound box, a rocking piece movably connected with said support and upon which the point of the needle rests, a groove-engaging point adapted to move vertically, a vibrating arm with which said groove-engaging point is connected, a connection between said vibrating arm and said support and a second connection be-



tween said vibrating arm and said rocking piece, the connection between the vibrating arm and the support being a universal connection.

5 5. A reproducing device for phonographs comprising a sound box having a diaphragm, an actuating part connected with said diaphragm and adapted to be moved laterally to actuate the diaphragm, a removable support connected with said sound box, a rocking piece movably connected with said support and upon which said actuating part rests, a groove-engaging point adapted to move vertically, a vibrating arm with which said groove-engaging point is connected, and a connection between said vibrating arm and said support and a second connection between said vibrating arm and said rocking piece, the connection between the vibrating arm and the rocking piece being a rocking connection.

6. A reproducing device for phonographs comprising a sound box having a diaphragm, a needle connected with said diaphragm and adapted to be moved laterally to actuate the diaphragm, a removable support connected with said sound box, a rocking piece movably connected with said support and upon which the point of said needle rests, a groove-engaging point adapted to move vertically, a vibrating arm with which said groove-engaging point is connected, a universal connection between said vibrating arm and said support and a rocking connection between said vibrating arm and said rocking piece.

7. A reproducing device for phonographs comprising a sound box having a diaphragm, a needle connected with said diaphragm and adapted to be moved laterally to actuate the diaphragm, a rocking piece upon which the end of said needle rests, the point of engagement between the needle and the rocking piece being at one side of the center of said rocking piece, an engaging point adapted to engage the groove of the record, and a connection between said engaging point and said rocking piece.

8. A reproducing device for phonographs comprising a sound box having a diaphragm, a needle connected with said diaphragm and adapted to be moved laterally

to actuate the diaphragm, a rocking piece upon which the end of said needle rests, the point of engagement between the needle and the rocking piece being at one side of the center of said rocking piece, an engaging point adapted to engage the groove of the record, and a connection between said engaging point and said rocking piece, said connection being at one side of the center of said rocking piece, the center of said rocking piece being located between said connection and the point where the needle engages it.

9. A reproducing device for phonographs comprising a sound box having a diaphragm, a needle connected with said diaphragm and adapted to be moved laterally to actuate the diaphragm, a support connected with said sound box, a rocking piece connected with said support and upon which the end of said needle is received, a spring with which said rocking piece is connected with said support, so that the piece is free to move with relation to the support, a groove engaging point adapted to engage a record having a groove varying in depth and a connection between said groove engaging point and said rocking piece, by means of which the rocking piece is moved to move said needle laterally.

10. A reproducing device for phonographs comprising a sound box having a diaphragm, a needle connected with said diaphragm and adapted to be moved laterally to actuate the diaphragm, a support connected with said sound box, said support having an arm, a laterally projecting part connected with said arm having two branches at an angle to each other, a rocking piece movably connected with one branch and upon which the end of said needle rests, a vibrating arm connected with the other branch and a connection between said vibrating arm and said rocking piece.

In testimony whereof, I affix my signature in the presence of two witnesses this 4th day of February 1914.

WILLIAM TURES.

Witnesses:

MINNIE M. LINDENAU,  
BESS MAWHINEY.



METALLIC ACOUSTIC DIAPHRAGM AND THE MANUFACTURE  
THEREOF,

#1,146,773-----Emanuel Aufiero,  
Patented-July 13, 1915.  
Filed-May 15<sup>th</sup>, 1911.



E. AUFIERO.  
METALLIC ACOUSTIC DIAPHRAGM AND THE MANUFACTURE THEREOF.  
APPLICATION FILED MAY 15, 1911.

1,146,773.

Patented July 13, 1915.

Fig. 1

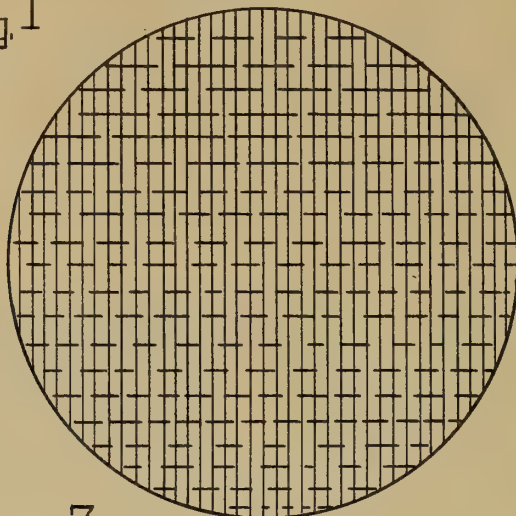
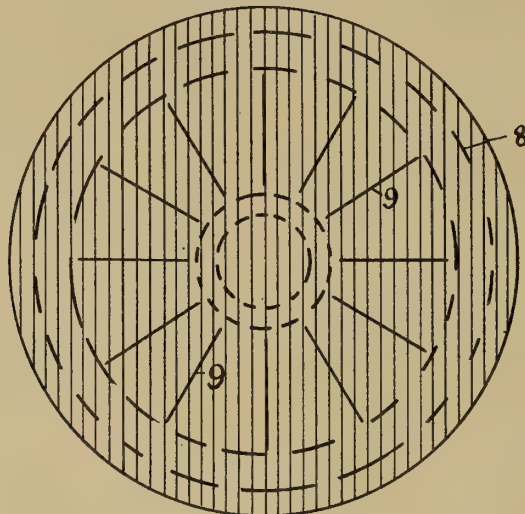


Fig. 2



Fig. 3



WITNESSES:

*Julius F. Hoerig*  
*Fred Krueger*

INVENTOR

*Emanuel Aufiero*

# UNITED STATES PATENT OFFICE.

EMANUEL AUFIERO, OF BROOKLYN, NEW YORK.

METALLIC ACOUSTIC DIAPHRAGM AND THE MANUFACTURE THEREOF.

1,146,773.

Specification of Letters Patent.

Patented July 13, 1915.

Application filed May 15, 1911. Serial No. 627,170. (Specimens.)

*To all whom it may concern:*

Be it known that I, EMANUEL AUFIERO, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented new and useful Improvements in Metallic Acoustic Diaphragms and the Manufacture Thereof, of which the following is a complete specification.

My invention relates to acoustic diaphragms such as are used in telephones, talking-machines, and particularly in automobilists' signaling-devices and the like.

Many defects have heretofore been observed in the behavior of acoustic diaphragms made of metal, such as lack of uniformity of vibration, due to lack of uniformity of sensitivity or lack of uniformity of tension, and the consequent production of secondary vibrating-segments, ripple-vibrations and the like. Attempts have heretofore been made to insure uniformity of vibration, as, for example, by providing the diaphragm with radial or concentric corrugations. These diaphragms, particularly those intended for automobile signals, are generally made of metal of the iron group, particularly of cold rolled steel, and possess considerable resilience or "springiness."

When the sheet-steel or the like has been passed through the rollers in the process of manufacture, it is supposed to be of uniform thickness and of the desired density and smoothness; nevertheless, the rolling has produced more or less curvature, and the steel-sheet is not perfectly flat. And when the diaphragm is cut from the sheet, it retains the slight curvature (being a portion of a cylinder rather than a perfectly flat plane). And when such diaphragm is clamped in place, as in the automobile horn, it seems to be held flat enough, so far as the eye can tell; nevertheless, there are decided differences of tension around different portions of the clamped periphery, and of course corresponding differences in sensitivity throughout its entire area. The corrugations above referred to have some effect, doubtless, in reducing these differences of tension, and to some extent tend toward producing uniformity of sensitivity and homogeneity of vibrativeness.

The present invention entirely removes the differences and produces absolute uniformity of behavior throughout.

The defects referred to are due primarily

to the non-uniformity of tension in the clamped diaphragm; and that is due to the difference between the tension throughout the convex surface of the unclamped diaphragm and the tension throughout the concave surface thereof (coincident with the slight warping or curvature referred to). I have discovered that uniformity of tension between the two surfaces of the unclamped diaphragm can be attained, and the diaphragm rendered perfectly flat without destroying its temper and "springiness", by increasing the tension of that surface which has less tension (or vice versa); and that this can be effected by producing a plurality of separate and localized and abnormal tension-areas. By "abnormal" is meant different from the original tension of that portion of the diaphragm. These localized abnormal tension-areas can be produced by striking the diaphragm repeated blows with a hammer, to produce a number of little dents, or by forcing against the diaphragm a suitable die having separated projections adapted to impart to the diaphragm such separated and localized abnormal tension-areas.

In order that my invention may be better understood, reference is hereby made to the accompanying drawings to illustrate the same.

In the drawings Figure 1 indicates a diaphragm dented by hammer-blows in carrying out my invention; Fig. 2 indicates, in exaggerated manner, a cross-section of a portion of a dented diaphragm; and Fig. 3 is a plan indicating a diaphragm upon which my invention has been carried out by the use of a die.

The unbroken parallel lines (extending lengthwise of the sheet) in Figs. 1 and 3 are intended to indicate the grain of the metal. The transverse broken lines in Fig. 1 are intended to represent the denting produced by the hammer-strokes. The broken concentric lines 8 and the radial lines 9 in Fig. 3 are intended to represent the localized areas of abnormal tension produced by the use of a suitable die in a power press. Some of the dents are indicated with great exaggeration in Fig. 2, at 7 and 7'. The dents of the hammer (or of the projections of the die) are preferably imparted transversely of the grain (which latter generally runs in the direction of curvature of the sheet-metal). These dents may be so slight as to

be scarcely visible on the surface treated, and not perceptible at all on the opposite side; but they have the effect of permanently flattening the diaphragm (without  
5 impairing its "springiness"); and thereafter when the diaphragm is clamped in place as in an automobile-horn, it is under uniform tension and has uniformity of sensitivity and can vibrate with uniformity.

10 Having thus described my invention, I claim:

1. A flat and uncorrugated and ungrooved acoustic diaphragm of uniform thickness

but with small localized and non-contiguous points of greater density than the rest of the  
15 diaphragm.

2. The process of producing an improved acoustic diaphragm, which consists of imparting small localized and non-contiguous points of increased density thereto, by imparting hammer blows to the metal at separate and non-contiguous points.  
20

EMANUEL AUFIERO.

Witnesses:

I. T. ROSENSON,  
LOUIS RUBES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

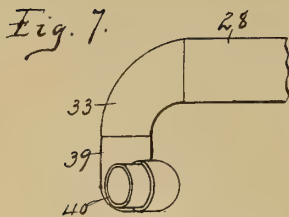
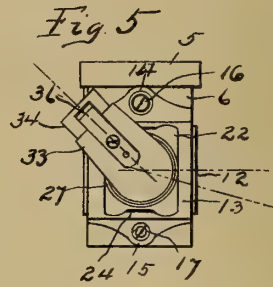
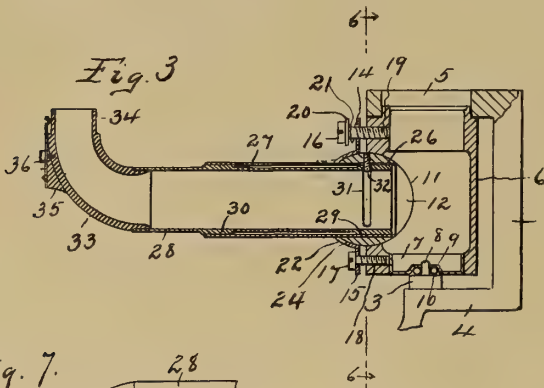
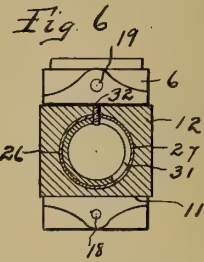
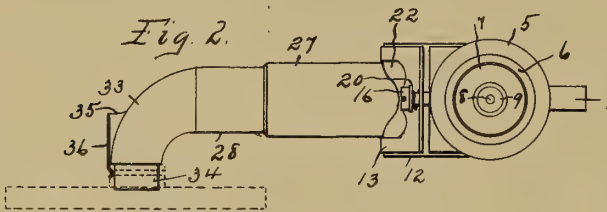
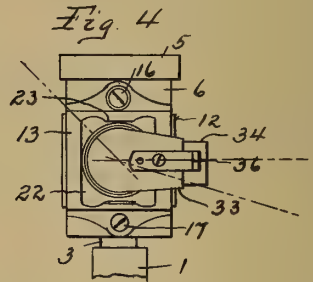
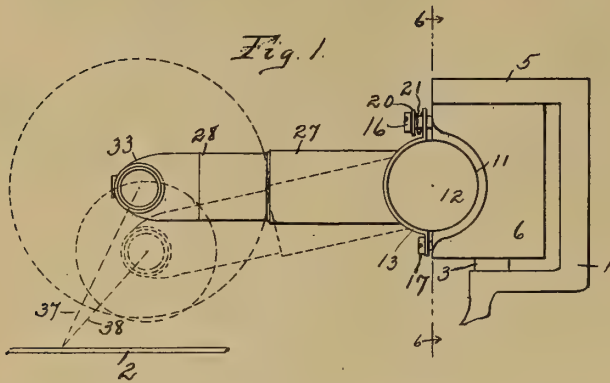


UNIVERSAL TONE ARM FOR TALKING MACHINES,  
#1,147,143-----P. Catucci,  
Patented-July 20, 1915.  
Filed-February 4, 1914.

P. CATUCCI.  
 UNIVERSAL TONE ARM FOR TALKING MACHINES.  
 APPLICATION FILED FEB. 4, 1914.

1,147,143.

Patented July 20, 1915.



WITNESSES:

L. Green.  
 W. R. Kalynger.

Pliny Catucci INVENTOR

BY  
 Louis M. Sanders ATTORNEY

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

UNIVERSAL TONE-ARM FOR TALKING-MACHINES.

1,147,143.

Specification of Letters Patent. Patented July 20, 1915.

Application filed February 4, 1914. Serial No. 816,425.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Universal Tone-Arms for Talking-Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to make and use the same.

My invention relates to tone arms for talking machines using the well known form of disk record and is designed especially for use in making such tone arm adjustable in a plane perpendicular to the plane of the record disk, so that sound boxes of different sizes may be used to reproduce records upon the same talking machine. Such sound boxes are now being made in different sizes to reproduce different classes of records and for different purposes;—for example the concert sound box is made exceedingly large, sometimes as large as twice the diameter of the ordinary sound boxes. If different sized sound boxes are placed upon the same tone arm, unless some special adjustment is made for the vertical adjustment of the tone arm, the stylus of the sound box will not track properly in the record groove.

It is essential in correct reproduction that the tone arm, swinging as it does in a plane parallel to the plane of the disk, should have the sound box so located that its stylus will swing through an arc which passes through the center of rotation of the disk. It is readily seen therefore, that unless some provision is made for the adjustment of the tone arm in a plane perpendicular to the plane of the record disk, with the use of sound boxes of different sizes having the points of their styluses more or less remote from the center of the diaphragm of the sound box, the result will be that the point of the stylus will not swing in the arc passing through the center of rotation of the disk.

My invention, as above indicated, contemplates the provision of means for such vertical adjustment of the tone arm.

Another feature of my invention resides in the provision of means whereby a section of the tone arm may oscillate so that the point of the stylus needle may follow any undulatory movement of the face of the record disk which may be due to inaccuracy in the driving shaft. The same means also

permits the oscillation of a section of the tone arm upon its axis, and with it the sound box through an angle of about 150 degrees into a position to permit the easy replacement of the stylus needle when necessary.

In carrying out my invention, I make use of the structure substantially as illustrated in the drawings, wherein—

Figure 1, is a side elevation of my improved tone arm, showing diagrammatically the positions occupied when sound boxes of extreme sizes are used. Fig. 2, is a plan view of the same. Fig. 3, is a sectional view of the tone arm and support showing the tone arm rotated through an angle of about 150 degrees. Fig. 4, is an end elevation of the tone arm showing the extreme outer end in position normally occupied for reproduction. Fig. 5, is a similar view showing the tone arm with its extreme end thrown out of playing position and into position for the removal and replacement of the stylus needle. Fig. 6, is a section on line 6—6 of Figs. 1 and 3. Figs. 7 and 8, show respectively, plan and side elevations of an adapter for use upon my improved tone arm.

In the drawings I have only shown so much of the talking machine as is necessary to illustrate my invention.

1 is the usual tone arm supporting bracket ordinarily secured to the side of the talking machine case.

2 represents the position occupied by a phonograph record in playing. The supporting bracket 1, is provided with a bearing 3, upon the ledge or shoulder 4, and an upper bearing ring 5.

Mounted in the bearing ring, and resting upon the bearing 3, is a generally hollow cylindrical block 6, closed at its bottom by means of a cup-shaped supporting member 7, centrally apertured to receive a positioning pin 8, and upwardly stamped in its center as at 9, to form a race-way for the ball bearings 10, upon which the block 6 is supported. One side of the cylindrical block 6, is cut out as at 11, to receive the cylindrical bearing block 12, as clearly illustrated in Figs. 1 and 3. The cut out portion 11, is semi-cylindrical so as to form a frictional bearing surface for the surface of the cylindrical block 12. The block 12, is held in place by means of the confining strap 13, made of thin sheet metal and surrounding the outer side of the cylinder 12, with the



securing lugs 14 and 15, firmly screwed to the body of the block 6, by means of the screws 16 and 17, which are screwed into apertures 18 and 19, in the side of the block 6.

5 Beneath the head of the screw 16, is the washer 20, between which and the lug 14 is the spring 21. Thus by the adjustment of the screws 16 and 17, the confining strap 13, may be made to bear with greater or less  
10 pressure upon the outer surface of the cylindrical block 12, so that said block 12, is frictionally held in the bearing 11, in the side of the block 6. The confining strap 13, is provided with a substantially rectangular  
15 opening 22, the vertical sides of which are parallel with each other, but the lower and upper sides are provided with stop projections 23 and 24, as clearly illustrated in Figs. 4 and 5.

20 Passing through an aperture 26, in the cylindrical block 12, rigidly secured therein, is the section 27 of the tone arm. Any means for securing the section 27 in position may be utilized, as for example, the well  
25 known process of sweating or of soldering.

Within the section 27, extends another section 28, provided at its inner end with a bearing band 29, and at its outer end a similar band 30, to form bearings with the  
30 inner and outer ends respectively of the section 27. Near the inner end of the tubular section 28, I provide a circumferential slot 31, running around said section for a distance of about 150 degrees to receive a  
35 screw pin 32, which is screwed through the body of the cylindrical block 12, and through the adjacent end of the tubular section 27, with its end extending as indicated into the slot 31. By this arrangement, the  
40 tubular section 28, may oscillate upon its axis through the angle of about 150 degrees. Rigidly secured in the outer end of the tubular section 28, is the rectangular elbow 33, the free end of which is reduced as at  
45 34, to form a thimble upon which the sound box is secured.

The reason for making the slot 31 about 150 degrees in length, is that when the sound box is mounted upon the thimble 34, the  
50 plane of the diaphragm of the sound box should be substantially at right angles to the disk record 2. It frequently happens as heretofore stated, that the mandrel or driving shaft is out of true, resulting  
55 in the wobbling of the record turn table and of the record itself. If the slot 31, terminated in a position so that the thimble 34, could not fall below the horizontal plane passing through the axis of the thimble 34, and parallel to the plane of the record disk  
60 2, the unevenness of the rotation of the record 2, would cause such record to leave the point of the stylus or wobble away from it. For this reason, the slot 31 is extended  
65 to a point so as to permit the end 34, of

the elbow 33 to oscillate about 15 degrees below the horizontal plane.

In order to swing the sound box into a position for the removal of the stylus needle, and the replacing of another one, it is  
70 necessary that the elbow 33 be swung back into the position indicated in Fig. 5, therefore the slot 31 is extended through an additional arc of 135 degrees so as to permit the tubular section 28, with its elbow 33, to  
75 swing into the position indicated in Fig. 5.

As a convenient means for securing the sound box in position upon the thimble 34, I provide the elbow 33 with the boss 35, having its outer face flat, upon which is  
80 secured the flat spring 36, having its outer end bent up as shown so that it may snap into a groove in the connecting thimble of the sound box.

In Fig. 1, I have shown the tone arm in  
85 full lines as indicating the position for carrying an extremely large or concert sound box, and in dotted lines the position occupied by such tone arm in carrying an extremely small sound box. The direction  
90 taken by the stylus needle in the two cases, is indicated by the two lines 37 and 38.

In practice the screws 16 and 17, are made to draw upon the lugs 14 and 15, to such a degree that the confining strap 13, together  
95 with the semi-cylindrical bearing 11, will offer considerable resistance to the free rotation of the block 12. The spring 21, however, makes this resistance a yielding one so that the tube 27, will remain in any position  
100 in which it is placed. Therefore, when a small sound box is located upon the thimble 34, it is only necessary to adjust the tube 27 downwardly to such a point that the plane of the diaphragm of the sound box will be  
105 substantially perpendicular to the plane of the record disk when the stylus 38, rests upon the face of the record 2, as illustrated in dotted lines in Fig. 1. When a larger or concert sound box is used,  
110 the tone arm is elevated into the position shown in full lines in Fig. 1, with the plane of the sound box perpendicular to the record when the stylus 37 rests upon the face of the record 2. The  
115 free oscillation of the tube 28, within the tube 27, as permitted by the slot 31, will take care of any unevenness in the record 2, for it permits, as heretofore described, the free oscillation of the tube 28, to some distance  
120 before the end of the slot 31, contacts with the limiting screw 32.

Thus it will be seen that I have accomplished all of the objects set forth above, by a structure which is at once simple and  
125 easy of manipulation, while its liability to disarrangement is reduced to a minimum.

It is to be understood that the sound amplifier is to be connected directly to the bracket ring 5. I have not deemed it neces-  
130



sary, however, to illustrate the sound amplifier as its use is well understood with those familiar with talking machines.

In Figs. 7 and 8, I have shown only the extreme end of the tone arm comprising the tubular section 28, and its elbow 33, upon the latter of which is placed what I term an adapter 39. This consists of a double elbow of the general form and contour illustrated and so placed upon the elbow 33, as to permit the connecting thimble 40, to extend upwardly and forwardly to an angle of about 45 degrees. This permits the location of the sound box 41, (shown in dotted lines in Fig. 8) to be placed upon the thimble 40, in such a position that the plane of its diaphragm will be inclined to the plane of the record 2, to an angle of about 45 degrees, which is the correct playing position for records of the Edison type wherein the record groove is an undulatory spiral impressed by means of elevations and excavations in the face of the record. It is to be understood in this connection, that the direction of the axis of the tube 28, will depend upon the height of the block 6, above the face of the record. However, the position of the tube 28, may be adjusted through the mechanism heretofore described.

It will be noted that with this double elbow adapter, the thimble 40, is not advanced materially away from the center of rotation of the tone arm so that the stylus point of the sound box will track properly and swing in the arc of a circle which passes through the center of rotation of the record disk.

I claim:

1. In a tone arm for talking machines, the combination of a hollow cylindrical block, means for pivoting said block to swing about a vertical axis, a semicylindrical bearing, in the side of said block, a cylindrical block secured in said bearing to oscillate upon a horizontal axis, means for frictionally engaging said block to hold the same in any adjusted position, a supporting tube passing diametrically through said last named block and communicating with the interior of said first named block, and a sound box tube mounted for limited axial oscillation within said supporting tube.

2. In a tone arm for talking machines, the combination of a hollow block pivoted to swing about its vertical axis, a supporting tube pivoted to the side of said block for limited oscillation in a vertical plane, and means secured to said block for frictionally holding said tube in any desired position.

3. In a tone arm for talking machines, the combination of a hollow block pivoted to swing about its vertical axis, a supporting tube communicating with the interior of said hollow block and pivoted thereto to oscillate in a vertical plane, and an adjustable

friction band secured to said block for holding said tube in any desired position.

4. In a tone arm for talking machines, the combination of a hollow block pivoted to swing about its vertical axis, a tube communicating with the interior of said block, and means secured to said block for permitting the manual adjustment of said tube in a vertical plane, and for frictionally retaining said tube in its adjusted position.

5. In a tone arm for talking machines, the combination of a hollow block pivoted to swing upon a vertical axis, a cylindrical block having a substantially horizontal diametrical aperture therethrough, said block being pivoted to the side of said hollow block to oscillate upon its horizontal axis, a friction band for holding said cylindrical block in any adjusted position in the side of said hollow block, a supporting tube rigidly secured in the aperture of said cylindrical block and communicating with the interior of said hollow block, and a sound box tube mounted for limited oscillation upon its axis within said supporting tube.

6. In a tone arm for talking machines, the combination of a hollow block pivoted to swing about its vertical axis, a supporting tube pivoted to the side of said block for limited oscillation in a vertical plane, means secured to said block for frictionally holding said tube in any desired position, means for holding said tube against axial rotation, a sound box tube extending into and in axial alinement with said supporting tube, a sound box upon the free end of said sound box tube, and means upon said tubes respectively for permitting a free but limited oscillation of said sound box tube within said supporting tube.

7. In a tone arm for talking machines, the combination of a hollow block pivoted to swing about its vertical axis, a supporting tube communicating with the interior of said hollow block and pivoted thereto to oscillate in a vertical plane, an adjustable friction band secured to said block to hold the tube in any desired position, a sound box tube extending into and in axial alinement with said supporting tube, and means upon said tubes respectively for permitting a free but limited axial oscillation of said sound box tube within said supporting tube.

8. In a tone arm for talking machines, the combination of a hollow block pivoted to swing about its vertical axis, a supporting tube communicating with the interior of said block and means secured to said block for permitting the manual adjustment of said tube in a vertical plane, and for frictionally retaining said tube in its adjusted position, a sound box tube extending into and in axial alinement with said supporting tube, and means upon said tubes respectively for permitting a free but limited

axial oscillation of said sound box tube within said supporting tube.

9. In a tone arm for talking machines, the combination of a supporting tube, means for  
5 permitting the radial adjustment of said tube about its point of support in a vertical plane and for frictionally retaining said tube in its adjusted position, a sound box tube extending into said supporting tube,  
10 and means upon said tubes respectively for permitting a free but limited axial oscillation of said sound box tube within said supporting tube.

10. In a tone arm for talking machines, the combination of a hollow block pivoted  
15 to swing about its vertical axis, a supporting tube pivoted to the side of said block for a limited oscillation in a vertical plane, means for frictionally holding said tube in  
20 any desired position, a sound box tube having a rectangular bend therein, one arm of which tube is inserted into said supporting tube to permit the other arm of said tube to oscillate in a vertical plane, and means for  
25 permitting a free but limited oscillation of said sound box tube around the axis of said supporting tube.

11. In a tone arm for talking machines, the combination of a hollow block pivoted  
30 to swing about its vertical axis, a supporting tube communicating with the interior of said hollow block and pivoted thereto to oscillate in a vertical plane, an adjustable friction band secured to said block for hold-

ing said tube in any desired position, a  
35 sound box tube inserted into the free end of and in axial alinement with said supporting tube, said sound box tube having a rectangular bend therein, one arm of which tube is inserted into said supporting tube to  
40 permit the other arm of said tube to oscillate in a vertical plane, and means upon said supporting tube and sound box tube respectively to permit a free but limited  
45 oscillation of said sound box tube around the axis of said supporting tube.

12. In a tone arm for talking machines, the combination of a hollow block pivoted to swing about its vertical axis, a supporting tube communicating with the interior  
50 of said block and means secured to said block for permitting the manual adjustment of said tube in a vertical plane and for frictionally retaining said tube in its adjusted position, a sound box tube inserted into the  
55 free end of said supporting tube and in axial alinement therewith, a circumferential slot in said sound box tube, and a screw pin inserted into said supporting tube for engagement with said slot whereby said sound  
60 box tube may have a free but limited axial oscillation within said supporting tube.

In testimony whereof, I have hereunto set my hand this 30 day of January, 1914.

PLINY CATUCCI.

In presence of—

L. M. SANDERS,

W. B. WALTZINGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

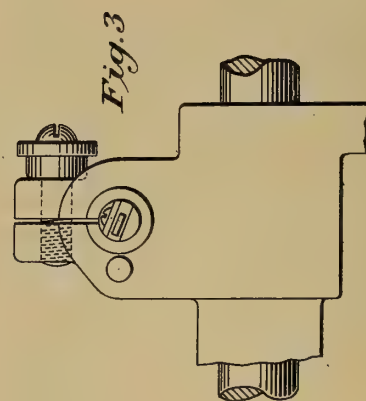
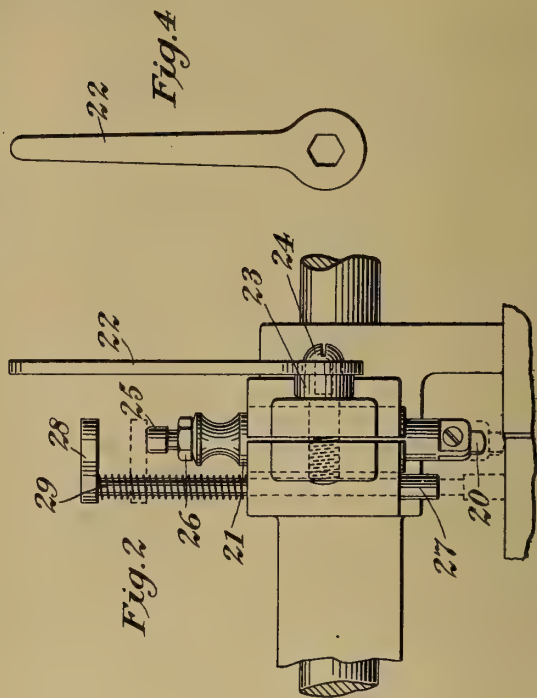
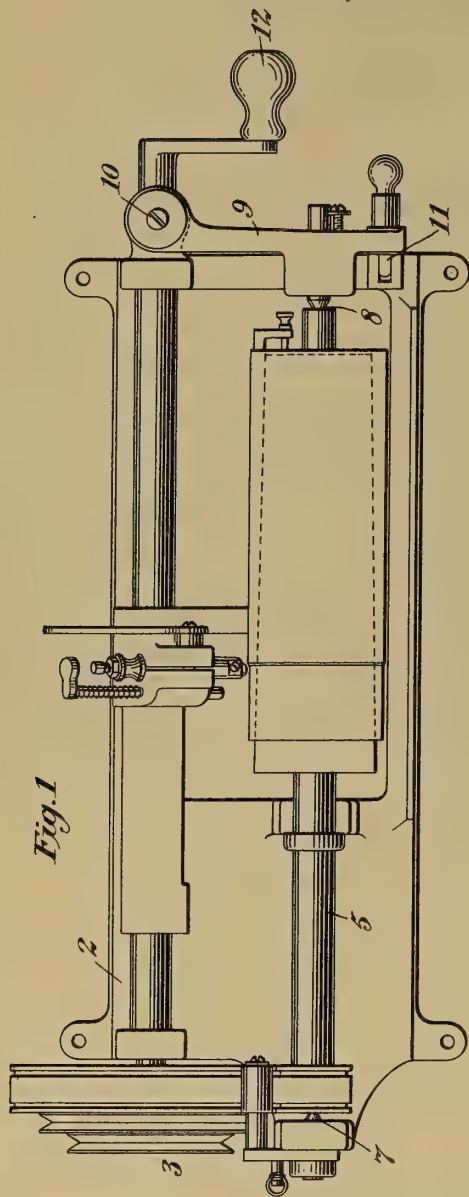


MACHINE FOR SHAVING GRAPHOPHONE BLANKS,  
#1,147,441-----H. P. Roberts,  
Patented-July 20, 1915.  
Filed-January 21, 1911.

H. P. ROBERTS.  
MACHINE FOR SHAVING GRAPHOPHONE BLANKS.  
APPLICATION FILED JAN. 21, 1911.

1,147,441.

Patented July 20, 1915.  
2 SHEETS—SHEET 1.



Witnesses:  
Chas. D. King,  
R. Champion

Inventor:  
Henry P. Roberts,  
by *[Signature]*  
Attorney.

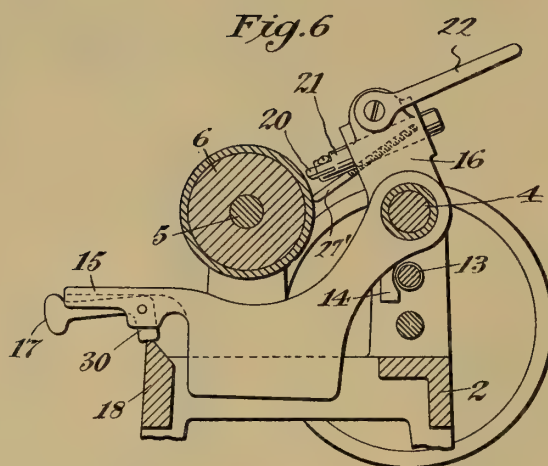
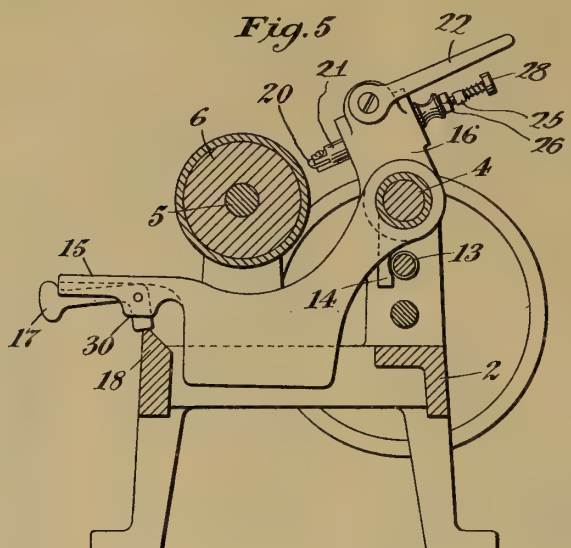




H. P. ROBERTS.  
MACHINE FOR SHAVING GRAPHOPHONE BLANKS.  
APPLICATION FILED JAN. 21, 1911.

1,147,441.

Patented July 20, 1915.  
2 SHEETS—SHEET 2.



Witnesses:  
Chas. D. King.  
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Inventor:  
Henry P. Roberts,  
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# UNITED STATES PATENT OFFICE.

HENRY P. ROBERTS, OF BROOKLYN, NEW YORK.

MACHINE FOR SHAVING GRAPHOPHONE-BLANKS.

1,147,441.

Specification of Letters Patent. Patented July 20, 1915.

Application filed January 21, 1911. Serial No. 603,800.

*To all whom it may concern:*

Be it known that I, HENRY P. ROBERTS, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machines for Shaving Graphophone-Blanks, of which the following is a specification.

This invention relates to a machine for shaving graphophone blanks, that is to say, wax and other record blanks of graphophones, phonographs and similar machines for recording sounds, etc. In machines of this class as heretofore constructed it has been customary to remove a record from a blank by shaving off a thin layer from the surface of the blank to present a new and smooth surface adapted to receive another record, and in such machines as heretofore constructed the cutter employed for removing the surface of a record blank has been located in its working position by adjusting it by hand to cut a chip of the desired thickness. In practice it has been found that it is difficult for careless or inexperienced operators to locate the cutter in its proper working position and that the cutter is frequently pushed into the surface of a blank to such a depth that an indentation is made in the surface of the record blank of a depth much greater than the chip necessary to be removed for the purpose of shaving off the record on the blank. When this occurs it is necessary to shave the surface of the blank several times before the whole record surface of the blank is smooth again, and unless such an indentation is obliterated it will interfere with the making of a perfect record the next time the blank is used. Moreover, the cutter, which is usually a sapphire, is frequently injured by improperly locating it in the manner just described and has to be replaced. When a deep indentation is made in this way in the blank and an unnecessarily deep shaving or series of shavings removed from the surface of the blank the storage capacity and consequently the life of the blank is materially reduced.

The principal object of my invention is to provide a machine of this class having means for positively locating the working face of the cutter relatively to the surface of the blank each time the cutter is to be brought to its working position, and to do this as perfectly when the operator is inexperienced or careless as in the case of the

best and most careful operator. In order to accomplish this result I provide a cutter-locating device the working face of which when in its operative position for determining the position of the working face or edge of the cutter is at a predetermined distance from that of the cutter, this locating device being so combined with the other parts of the machine that when, for example, its working face is brought into contact with the surface of the blank to be shaved the working face of the cutter will then be spaced a short but predetermined distance from the surface of the record blank and may be brought to its working position for taking a chip by shifting the cutter-carrier from an idle to a working position, the former corresponding, in the commercial graphophone, to the position of rest of the blank, and the latter corresponding to the position of the parts when the blank is rotated. In the species of shaving machines in which the cutter and its carrier are not shifted from an idle to a working position after the cutting position of the cutter with respect to the blank has been determined such a locating device may be brought into contact with the record medium, at any point on the surface of the blank to locate the edge of the cutter and then withdrawn. In this case, as in the first, the edge of the cutter will be positively located in a predetermined position with respect to the surface to be shaved, but the device for shaving the blank will be located in the wax of the record medium and not in the air as in the first case. The locating device may be mounted on the cutter-bar or independently thereof and may be either fixed relatively to the cutter or have any desired adjustment relative thereto. It is preferably so constructed and combined with the other parts as to be retracted to a normally inoperative position, where it is out of the way when not in actual use for determining the position of the working face of the cutter.

An important feature of the invention is the provision of means for varying the predetermined relation between the working face of the locating device and the working face or edge of the cutter for the purpose of regulating the depth of the cut to be made and consequently the thickness of the chip taken. This means preferably comprises a device for effecting a fine adjust-



ment of the relation between the working faces of the locating device and cutter, which predetermined relation is maintained throughout all other movements of the parts until it is desired to change such relation and take a chip of another thickness.

Other features of the invention not hereinbefore referred to will be hereinafter described and claimed, and are illustrated in the accompanying drawings, in which—

Figure 1 is a plan and partial perspective view of a shaving machine embodying my present invention; Fig. 2 is an enlarged detail illustrating substantially in plan a cutter and locating device and cooperating parts in operative relation with a blank; Fig. 3 is an elevation of the same, looking toward the edge of the cutter; Fig. 4 is a detail of a clamping device for securing the cutter in its located position; Fig. 5 is an end elevation, partly in section, of the shaving machine, looking from the right in Fig. 1, and Fig. 6 is a similar view of a modification of the invention which will be hereinafter described.

Similar characters designate like parts in all the figures of the drawing.

Referring first to Figs. 1 to 5 inclusive, 2 designates the bed or main frame of a shaving machine of well-known type for shaving graphophone and similar record blanks. Most of the parts of such a machine to which my invention may be applied are or may be of well-known construction. With the exception of the parts hereinbefore referred to and which will be hereinafter described more specifically, most of the parts illustrated are of well-known construction. These well-known parts comprise the usual driving mechanism, designated generally by 3, for transmitting power from the shaft 4 to the shaft 5 which supports the blank-carrier 6. This shaft 5 is supported, as is usual, by needle bearings or centers 7 and 8, the former of which may be in fixed relation with the main frame of the machine, while the latter is carried by the usual swinging arm 9 pivoted at 10 and having a pin or other suitable device 11 for locating the swinging arm 9 in its operative position with its center or pivot 8 in engagement with the cupped end of the shaft 5. The machine shown here has a hand-operated operating device, the winding handle being indicated at 12 and the transmitting means for imparting the longitudinal feed movement to the cutter, the cutter-bar and associated parts being illustrated as the usual complementary feed members 13 and 14, the former being the feed-screw and the latter depending, as is usual, from the cutter-carrier. The machine shown also embodies the usual weighted operating lever or handle 15, also secured to the cutter-carrier, which is designated generally by 16, and an

auxiliary handle or lever 17 mounted on 15 and cooperative with the edge of the rail 18 in the well-known manner for the purpose of moving the main lever 15, the cutter-carrier and all parts mounted on the cutter-carrier to the idle or working position, as desired. Other features or details of said machine also are or may be of well-known construction and need not be specially described. The cutter-carrier and most of the parts mounted on it may be also of well known construction. For example, a cutter, such as 20, may be secured to a substantially cylindrical cutter-bar 21 movable in a bore in the cutter-carrier 16 toward and from the axis of the shaft 5 and hence toward and from the surface of a positioned blank to be shaved. The cutter-carrier is ordinarily so formed as to constitute a split clamp or clamping-sleeve adapted to be closed on the cutter-bar 21 to secure said cutter-bar in any desired adjusted position. This may be accomplished by means of a lever-arm 22 and a clamping-screw 23 to which said lever-arm is secured. In the present case the screw 23 has a hexagonal head on which the lever-arm 22 may be secured in any one of various positions by means of a set-screw 24. The cutter-bar is preferably so constructed as to provide for adjustment of the relation between it and the cutter-locating device hereinbefore referred to and which is to be hereinafter described in detail. This adjustment may be obtained in any desired manner, a simple means for the purpose being an adjustable stop-pin or rod 25 in the head of the cutter-bar and a check-nut 26 for maintaining the adjustable part 25 in any desired position. The manner in which the split clamping-sleeve or collar on the cutter-carrier 16 is closed upon and released from the periphery of the cutter-bar 21 will be obvious (see particularly Fig. 2).

In connection with the other elements of a shaving machine, most of which elements have been hereinbefore described in detail, I make use of a suitable locating device or gage for predetermining the working position of the edge of the cutter 20. This locating device may be constructed in many ways within the scope of my invention, but in all cases it should be so associated with the cutter as to have its working face at a predetermined distance from that of the cutter when the locating device is in its operative position. It is convenient to mount this cutter-locating device on the cutter-carrier 16, and it is so shown herein. So far as its main function is concerned it is immaterial whether this cutter-locating device be in fixed relation with the cutter or movable relatively thereto and mounted independently thereof. In Fig. 6 a fixed relation of the cutter and the locating device is illustrated, whereas in the other views the locat-



ing device is movable relatively to the cutter and is also mounted independently of it. In these main views (Figs. 1 to 5 inclusive) I have illustrated one kind of independently mounted locating device which may be used. As here shown it comprises a rod 27 mounted in a bore in the cutter-carrier 16 adjacent to and substantially parallel with the bore for the cutter-bar and movable therein toward and from the surface of the blank to be shaved. The center line of this bore, as shown passes through the center of the shaft 5, this being the preferred position. At its working end which comes in contact with the surface of the record blank the locating device 27 is preferably broad and flat so as to touch the wax surface but not indent or mar the same. At its opposite end the actuating device preferably has means, such as the fixed lateral arm 28, for actuating the cutter-bar and cutter and carrying them with it during the last part of its movement toward the blank. The relation of the cutter and cutter-bar on the one hand and the locating device and actuator on the other is such that when the arm 28 is in contact with the head of the stop 25 the distance between the working faces of the cutter and the locating device will be the depth of the chip to be taken by the cutter. The relation of these parts is such that the working face of the locating device, in the construction shown in Figs. 1 to 5, will come in contact with the surface of the blank before the cutter can touch it, and it will thus be impossible for a careless or inexperienced operator in the ordinary handling of the machine to bring the cutter improperly in contact with the wax and mar the surface of the blank. When the working face of the locating device is in contact with the blank, as just described, the cutter-bar (which, it will be understood is loose and free to move lengthwise in the clamping device) should be secured in the located position, this being done by turning the lever-arm 22 to close the sides of the clamping-sleeve on the cutter-bar. When the cutter is thus secured in its working relation the locating device may be shifted to its inoperative position, this being done in the preferred construction by suitable means, such as a spring 29 normally tending to shift the locating device away from the blank to its inoperative position. The inoperative position in this case is one in which the locating device is not only clear of the blank and out of the path of the chips taken by the cutter but also above and at one side of the cutter when the latter is in its cutting position. The operations just described of bringing the locating device into contact with the surface of the blank and then clamping the cutter-bar in place when the cutter has thus been located in the working relation, are both performed in the

type of machine shown herein when the lever or main operating handle is up in the position shown in Figs. 5 and 6. In such a machine the cutter will not come into contact with the blank to take a chip until the auxiliary handle 17 is dropped to the face 30 of the lever or handle 15 comes into contact with the rail 18, when the cutter will begin to take its chip as the driving mechanism begins to turn the blank.

In the modification shown in Fig. 6 all of the main parts of the machine are or may be of the same construction as just described and are designated by the corresponding reference characters, except the means for locating or gaging the position of the cutter. In this view the locating device is also illustrated as performing its locating or gaging function in the air and not in the wax of the record blank, that is to say, it makes surface contact only, as in the construction illustrated in Figs. 1 to 5, with the blank and does not make an indentation therein. In this case, however, the locating device, which is designated generally by 27', is or may be in fixed relation with the cutter-bar. It is illustrated as a simple pin threaded into a tapped diagonal bore in the cutter-bar, the threads being for the purpose of adjustment, that is, for the purpose of regulating the predetermined relation between the working faces of the cutter and the locating device, and hence regulating the thickness of the chip to be removed. This locating device is not in a radial line passing through the axis of the shaft 5 but is slightly below it. The device 27' is located by merely moving the cutter-bar toward the axis of the shaft 5 until the working face of the locating device is in contact with the blank while the main lever 15 is up, as shown in Fig. 6. In this position, as will be seen, the cutter is not in contact with the blank. To bring the cutter into action the auxiliary handle 17 is then dropped to bring the stop-face of the main lever 15 into contact with the rail 18. This movement brings the cutter into position for taking its chip and causes the working face of the device 27' to move down and back away from the surface of the blank. Of course the cutter-bar is clamped in place in the manner before described as soon as it is located.

The device shown in Figs. 1 to 5 is equally well adapted for use in shaving machines of the type which do not have the auxiliary handle 17, except that in that case the working face of the cutter will be so located relatively to that of the device 27 as to be forced into the wax of the blank a distance substantially equal to the thickness of the chip to be taken.

Other modifications of the means for carrying out my invention will readily suggest



themselves to the skilled constructor and need not be described in detail.

What I claim is:

1. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter, and a cutter-locating device the working face of which when in its operative position is at a predetermined distance from that of the cutter, said locating device being movable into and out of operative position and being positively located in a predetermined position wholly out of contact with the blank while the blank is turning.

2. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter, a cutter-locating device the working face of which when in its operative position is at a predetermined distance from that of the cutter, said locating device being movable into and out of operative position, and means for normally holding said locating device in its inoperative position.

3. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter, a cutter-locating device the working face of which when in its operative position is at a predetermined distance from that of the cutter, said locating device being movable into and out of operative position, and a spring for normally retracting said locating device to its inoperative position.

4. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter, a cutter-locating device the working face of which when in its operative position is at a predetermined distance from that of the cutter, said locating device being movable into and out of operative position in the latter of which it is clear of the blank and located above the working face of the cutter, and a spring for normally retracting said locating device to its inoperative position.

5. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter, and a cutter locating and actuating device movable as a whole away from the blank independently of the cutter and having means for moving the cutter toward its working position and also having a working face which when in its operative position is at a predetermined distance from that of the cutter, said cutter locating and actuating device being movable to said operative position.

6. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter-carrier, a cutter-bar movable on said carrier into and out of working position, a cutter secured to said cutter-bar, and a cutter-locating

device mounted on the cutter-carrier independently of said cutter-bar and having a working face which when in its operative position is at a predetermined distance from that of the cutter, said locating device being also movable into and out of operative position.

7. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter-carrier movable to shift a cutter and a cutter-bar into or out of working position, a cutter-bar movable on said carrier into and out of working position, a cutter secured to said cutter-bar, a cutter-locating device mounted on the cutter-carrier independently of said cutter-bar and movable away from the blank independently of the cutter and having a working face which when in its operative position is at a predetermined distance from that of the cutter, said locating device being also movable to said operative position, and means for clamping the cutter-bar to the cutter-carrier when the working face of said locating device is in its operative position.

8. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter-carrier movable to shift a cutter and a cutter-bar into or out of working position, a cutter-bar movable on said carrier into or out of working position, a cutter secured to said cutter-bar, a cutter locating and actuating device mounted on the cutter-carrier independently of said cutter-bar and embodying means for moving the cutter-bar with it toward a working position and also having a working face which when in its operative position is at a predetermined distance from that of the cutter, said cutter-locating device being also movable into and out of operative position, and means for clamping the cutter-bar to the cutter-carrier when the working face of said locating device is in its operative position.

9. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter-carrier movable to shift a cutter and a cutter-bar into or out of working position, a cutter-bar movable on said carrier into or out of working position, a cutter secured to said cutter-bar, a cutter locating and actuating device mounted on the cutter-carrier independently of said cutter-bar and embodying means for moving the cutter-bar with it toward a working position and also having a working face which when in its operative position is at a predetermined distance from that of the cutter, said cutter-locating device being also movable into and out of operative position, means for clamping the cutter-bar to the cutter-carrier when the working face of said locating device is

in its operative position, and means constantly tending to shift the cutter-locating and -actuating device away from its operative position and out of operative relation  
5 with said cutter-bar.

10 10. In a machine for shaving graphophone blanks, the combination with means for supporting and turning a blank, of a cutter-carrier movable to shift a cutter and  
15 a cutter-bar into or out of working position, a cutter-bar movable on said carrier into or out of working position, a cutter secured to said cutter bar, a cutter locating and actuating device mounted on the cutter-carrier independently of said cutter-bar and embodying means for moving the cutter-bar with it toward a working position and also having a working face which when in its oper-

ative position is at a predetermined distance from that of the cutter, said cutter-locating device being movable also into and out of  
20 operative position, means for varying the predetermined distance between said working faces to regulate the depth of the cut, and means for clamping the cutter-bar to  
25 the cutter-carrier when the working face of said locating device is in its operative position.

Signed at New York, in the county of New York, and State of New York, this  
30 16th day of January, A. D. 1911.

HENRY P. ROBERTS.

Witnesses:

JEANNETTE STORK,  
C. S. CHAMPION.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





SOUND REPRODUCER.

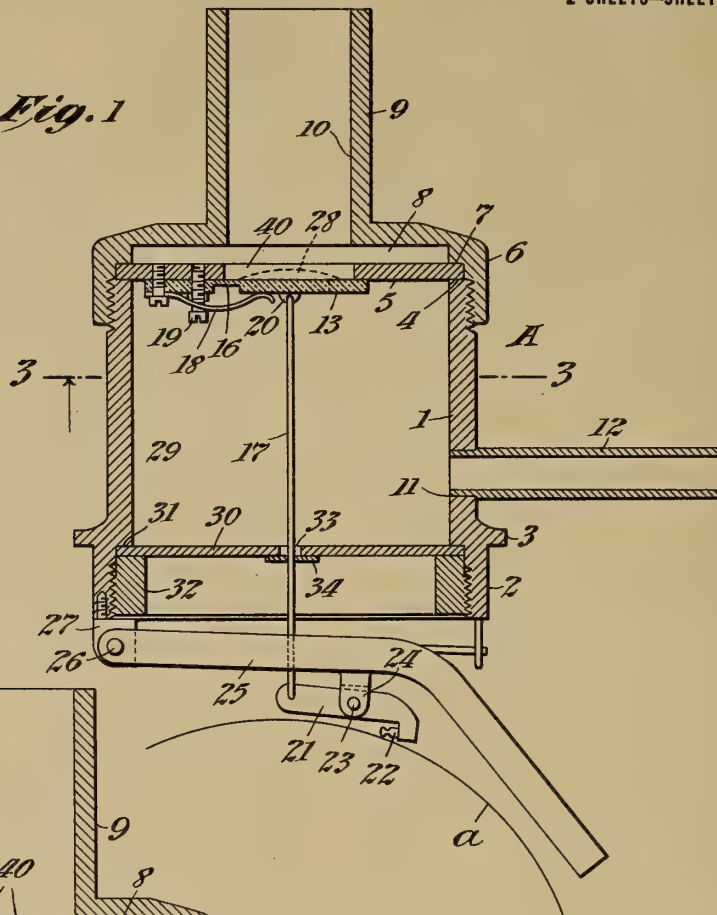
1,148,619 ----- A. N. Pierman.  
Patented August 3, 1915,  
Filed March 22, 1906.

A. N. PIERMAN.  
SOUND REPRODUCER.  
APPLICATION FILED MAR. 22, 1906.

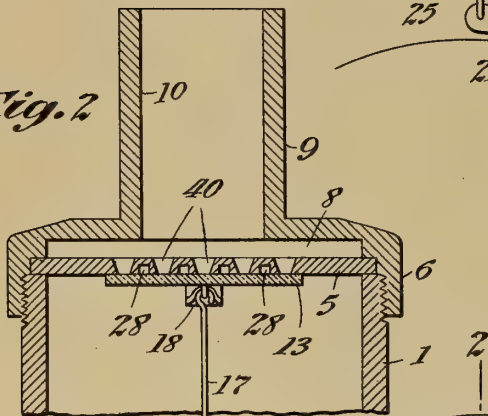
1,148,619.

Patented Aug. 3, 1915.  
2 SHEETS—SHEET 1.

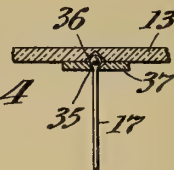
*Fig. 1*



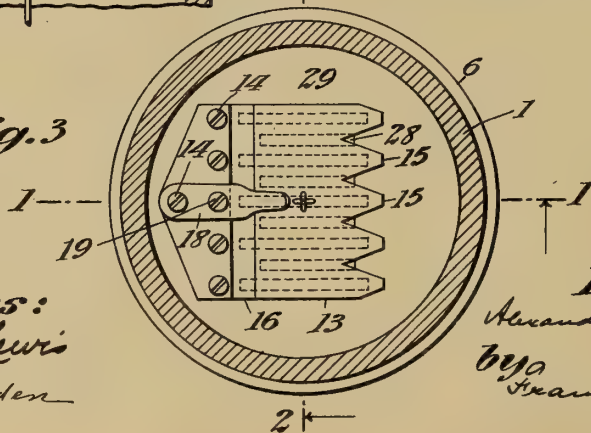
*Fig. 2*



*Fig. 4*



*Fig. 3*



*Witnesses:*  
*Frank D. Lewis*  
*Delos Holden*

*Inventor:*  
*Alexander N. Pierman*  
*by* *Frank L. Green*  
*Atty.*





A. N. PIERMAN.  
SOUND REPRODUCER.  
APPLICATION FILED MAR. 22, 1906.

1,148,619.

Patented Aug. 3, 1915.  
2 SHEETS—SHEET 2.

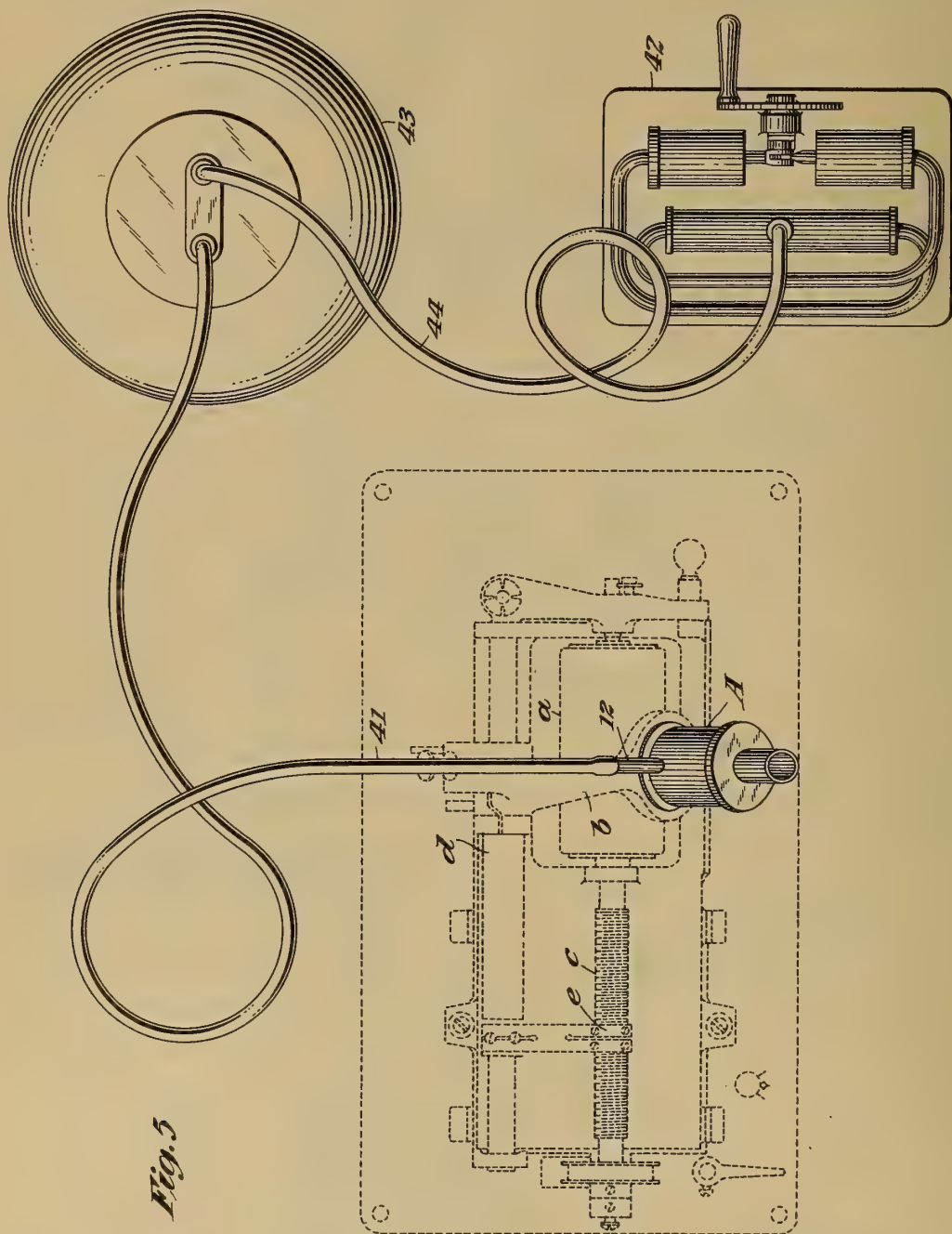


Fig. 5

Witnesses:  
Frank D. Lewis  
Delos Holden

Inventor:  
Alexander N. Pierman  
by  
Frank L. Soper  
Atty.

# UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## SOUND-REPRODUCER.

1,148,619.

Specification of Letters Patent. *Patented Aug. 3, 1915.*

Application filed March 22, 1906. Serial No. 307,324.

*To all whom it may concern:*

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Reproducers, of which the following is a description.

My invention relates to sound reproducers of the type described and broadly claimed in my application filed November 24th, 1905, Serial No. 288,837, wherein the sounds are produced by vibrations resulting from varying the extent of opening of ports situated in a sound chamber and adapted to permit the passage of a body of air or other elastic fluid, the valve being elastic and operating by flexure, although the present invention may be applied to reproducers in which the valve is capable of pivotal or reciprocatory movement. In the operation of the apparatus disclosed in said application I have found that while very good reproduction of some phonograph records has been obtained, the reproduction of other records has been more or less imperfect, at least to persons whose hearing is sufficiently refined to enable them to detect the imperfection. Furthermore the said apparatus, while adapted to be operated by very low air pressure, such as that which will sustain a mercury column of about two and a half inches, will give favorable results only when the pressure within the exhaust tube which leads from the reproducer is maintained substantially constant. I have now discovered that it is possible to construct a reproducer of this type wherein the pressure may vary considerably without affecting the quality or very noticeably affecting the volume of the sounds produced by the instrument and which will reproduce all records with a high degree of excellence. The improved results referred to are obtained by greatly increasing the volume of the chamber below the valve so that it will not resonate and will equalize the flow of air through the reproducer, which improvement will be hereinafter more fully set forth and claimed together with certain other improved details of construction. My invention also relates to improved means for producing a flow of air through the repro-

ducer, and to the mounting of the reproducer upon the traveling carrier arm of a phonograph as described but not claimed in said application Serial No. 288,837.

Reference is hereby made to the accompanying drawings of which—

Figure 1 is a vertical section of a sound reproducer constructed in accordance with my invention, the sectional plane being indicated at 1—1, Fig. 3; Fig. 2 is a section on line 2—2 of Fig. 3; Fig. 3 is a section on line 3—3, of Fig. 1; Fig. 4 is a sectional detail of a modified connection between the valve and operating link. Fig. 5 is a plan view showing my invention applied to a phonograph of the Edison type.

In all the views corresponding parts are indicated by the same reference numerals.

The reproducer shown comprises a hollow body A composed of the cylinder 1, plate 5, and cap 6, the former being provided with depending and lateral annular flanges 2 and 3 respectively which are adapted to fit within the reproducer carrier arm *b* of a phonograph which forms a part of the traveling carriage *d*. The upper end of the cylinder 1 forms a seat 4 upon which the circular plate 5 of brass or other suitable material is clamped by the cap 6 threaded upon the cylinder 1 and having a shoulder 7 which bears against the said plate 5 leaving preferably a low space or chamber 8 between the plate 5 and body of the cap 6 parallel thereto. A neck 9 having a cylindrical bore 10 whose diameter is about the same as the length of the ports 40 of the plate 5 extends upward from the body of the cap 6 and is adapted to be connected with an amplifying horn or megaphone in any suitable manner as by a section of rubber tubing; the space 8, bore 10 and horn form a resonating chamber or chambers leading from the atmosphere to the ports 40. The plate 5 is substantially the same as that disclosed in the application referred to and may be one-sixteenth of an inch in thickness and provided with a series of rectangular slots measuring one-half inch in length by three sixty-fourths of an inch in width at the valve seat, forming ports for the passage of the air or other elastic fluid. In the device described in the said application the slots



are formed with parallel walls, but improved results may be obtained by forming the slots so that the walls thereof converge in the direction of the flow of the elastic fluid as clearly shown in Fig. 2. The cylinder 1 is apertured at 11 to receive the tube 12 which is connected by a flexible connection, such as a rubber tube 41, with any suitable apparatus for producing suction, for example—an air pump 42, the flexible connection permitting the carrier arm *b* and body *A* to be fed across the record by the engagement of the usual feed nut *e* with the feed screw *c*, while a continuous flow of air is maintained through the reproducer. The extent of opening of the ports 40 is varied by any suitable valve, such as the plate 13, which may be of a hard, elastic and flexible material such as the various metals and alloys, but which is preferably of celluloid of the shape shown in the drawings and measuring three-fourths of an inch square by one thirty-second of an inch in thickness. This plate is seated upon and covers the ports 40 as shown, being secured along one edge to the plate 5 by screws 14, the opposite or free edge being serrated to form tongues 15. A groove 16 is formed transversely of the plate 13 so as to weaken the same along the line of flexure produced by the operating link 17. A spring 18 is held at one end by the middle screw 14 and presses at its free end upon the plate 13 at or near its center. An adjusting screw 19 passes through the intermediate portion of the spring 18 and plate 13 and is threaded in the plate 5, whereby any desired degree of pressure of the spring 18 upon the plate 3 may be obtained and the spring 18 will be held against lateral movement so that its free end will always bear upon the medial line of the valve 13. The retractile force due to the resiliency of this spring and of the valve plate 13, balances the downward force due to the air pressure which will be produced upon the valve 13 by the action of the suction device applied to the tube 12. The pressure of the spring increases as the plate is moved downward which movement increases the flow of air so that a substantially perfect balance is maintained in all positions of the plate 13, and by varying the tension of the spring 18 by the adjusting screw 19 proper compensation may be made for variations in the operating air pressure and flexibility of the valve 13. The operating link 17 is connected at one end to the valve 13 in any suitable manner, as by an eye 20 secured to said valve. The link is connected at its other end to the lever 21 which carries the reproducing stylus 22. The lever 21 is pivoted at 23 to a lug or lugs 24 carried by a floating weight 25 which is pivoted at 26 to a block 27 threaded in the flange 2. This weight moves freely up and

down to permit the stylus 22 to follow irregularities in the contour of the record surface *a*.

In order to facilitate the escape of air through the ports 40 of the plate 5, grooves or recesses 28 are formed in the lower surface of said plate between and parallel to the said ports. These recesses 28 extend practically the entire length of the ports 40, the ends of the said recesses extending beyond the limiting edge of the plate 13 so as to be in free communication with the equalizing chamber 29. This chamber is formed within the part 1 and is of considerable volume as compared with the flow of air through the apparatus which is preferably small.

I have obtained favorable results with ports and valve of the dimensions specified and an air pressure or suction capable of sustaining two and one-half inches of mercury by constructing the chamber 29 in the form of a cylinder whose diameter is one and one-fourth inches and height one inch, but obviously the volume of this chamber may vary considerably, although it is of course desirable to make it as small as possible without impairing the quality and range of reproduction of the apparatus. The increased size of the chamber 29 not only equalizes the flow of air but eliminates objectionable resonance which sometimes occurs with the device of my prior application as a hissing sound like that of air escaping or exhausting through a small opening. The lower end of the chamber 29 is closed by a plate 30 held against the annular shoulder 31 by a clamping ring 32 threaded within the flange 2. The plate 30 is provided with a central aperture 33 through which the link 17 passes and this opening is preferably of sufficient size to allow the link to operate freely, the opening 33 being closed by a small washer 34 of paper or other soft material which surrounds the link 17 and will be held against the plate 30 by atmospheric pressure. By this means friction and wear upon the link 17 and leakage of air around the same are practically eliminated.

In the modification of Fig. 4 the link 17 is connected to the valve plate 13 by a ball and socket joint. The link 17 is preferably a small wire and the ball 35 may be formed by fusing the end thereof. This ball is held in the socket 36 formed in any suitable manner as by cementing to the plate 13 a socketed plate 37 through which the link 17 passes.

As previously stated any air exhausting apparatus may be used, but I prefer, in order to obtain a uniform flow, to use a tank 43 to which the tube 41 is connected, an exhaust pipe 44 leading from said tank to the pump 42 which is shown as a two-cylinder, hand operated suction pump. This



pump may be operated continuously during the reproduction of a sound record, by hand or a suitable motor, in which case the pump and the tank 43 may be of comparatively small dimensions. If desired, however, their size may be increased, and the pump used to produce a high degree of vacuum, (for instance one which will sustain 26 inches of mercury) in the tank 43, prior to the operation of the reproducer. A cylindrical tank measuring twelve inches in diameter by twelve inches in height when exhausted to this degree is of sufficient size to play one entire record of ordinary length.

The operation of the device is as follows: The body A being held in the traveling carrier arm *b* of a phonograph with the stylus 22 in operative position upon the phonogram or sound record *a*, suction is applied to the tube 12 which produces a downward stress upon the plate 13 and slightly opens ports 40. This stress is then balanced by the resiliency of the plate 13 and the upward pressure of the spring 18 so that the ports 40 remain slightly open, allowing the passage of a stream of air. As the reproducer stylus 22 is moved upward by an elevation of the sound record groove, it draws the link 17 downwardly and causes the plate 13 to flex, thereby increasing the extent of opening of the ports 40 and allowing an increased flow of air therethrough. As the stylus 22 passes over the elevation and descends into a depression, the elasticity of the plate 13 and of the spring 18 decreases the extent of opening of the ports 40 thereby diminishing the flow of air. The varying of the extent of opening of the ports 40 is thus effected in exact accordance with the elevations and depressions of the sound record groove and the result is to produce sounds which are representative of said elevations and depressions, and which, as before stated, are of very perfect quality and may be of great volume.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. In a sound reproducer, the combination of a hollow body, a port plate therein dividing the said hollow body into an equalizing chamber upon the exit side of the said port plate and making up the greater portion of said hollow body, and a relatively small resonating chamber upon the opposite side of said port plate, a plate valve seated upon said port plate and upon the ports therein, means for producing a flow of elastic fluid through the ports and means for operating the plate valve to vary the extent of opening of the ports, substantially as set forth.

2. In a sound reproducer, a hollow body having a comparatively small resonating chamber and an equalizing chamber having several times the volume of said resonating chamber, the said chambers communicating

through ports, means for producing a flow of elastic fluid through said ports from said resonating chamber into said equalizing chamber, a valve seated upon said ports and means for operating said valve to vary the extent of opening of the ports, substantially as set forth.

3. In a sound reproducer, the combination of a hollow body having ports, means for producing a flow of elastic fluid there-through, a valve of elastic material seated upon said ports, an equalizing chamber upon the exit side of said ports the volume of which is sufficient to prevent excessive variation in the operating fluid pressure, and means for flexing said valve to vary the extent of opening of said ports, substantially as set forth.

4. In a sound reproducer, the combination of a hollow body having ports, and a celluloid plate secured at one edge and operating by flexure to vary the extent of opening of the ports, said plate being weakened along the line of flexure, substantially as set forth.

5. In a sound reproducer, the combination of a hollow body provided with a port member having a set of ports therein, a plate for varying the extent of opening of said ports, recesses between adjacent ports, and means for flexing said plate, said recesses being so placed as to communicate with the ports only when the latter are opened by said plate, substantially as set forth.

6. In a sound reproducer, the combination of a hollow body having slots therein and having grooves adjacent said slots, a plate seated on said slots and grooves, the grooves extending beyond the margin of said plate and means for moving said plate, substantially as set forth.

7. In a fluid pressure sound reproducer, the combination of a hollow body having a resonance chamber and an equalizing chamber communicating through ports, said equalizing chamber being located on the exit side of said ports and having sufficient volume to prevent excessive variation in the operating fluid pressure, an apertured plate at the lower end of said body, a valve for varying the extent of opening of said ports, and means extending through said apertured plate for operating said valve, substantially as set forth.

8. In a fluid pressure sound reproducer, the combination of a hollow body having a resonance chamber and an equalizing chamber communicating through ports, said equalizing chamber being located on the exit side of said ports and having sufficient volume to prevent excessive variation in the operating fluid pressure, an apertured plate at the lower end of said body, a valve for varying the extent of opening of said ports,

means extending through said apertured plate for operating said valve, and an outlet tube fixed within the wall of said body and communicating with said equalizing chamber, substantially as set forth.

9. In a sound reproducer, the combination of a hollow body having a set of ports, a plate of elastic material seated upon said ports, a spring pressing on said plate at or near its center, means for varying the pressure of said spring, and means for flexing said plate to vary the extent of opening of said ports, substantially as set forth.

10. In a sound reproducer, the combination of a hollow body having a set of ports, an elastic valve plate adapted to vary the extent of opening of said ports, a spring rigidly secured at one end and pressing at its free end against said valve plate at or near its center, and an adjusting screw passing through the intermediate portion of said spring, substantially as set forth.

11. In a sound reproducer, the combination of a hollow body having ports, a valve for varying the extent of opening of said ports, and means for operating said valve comprising a stylus, a pivoted fulcrum support, a lever pivoted thereon, and a link, said link being connected to said valve by a universal joint, substantially as set forth.

12. In a sound reproducer, the combination of a hollow body having ports, a valve for varying the extent of opening of said ports, and means for operating said valve comprising a stylus, a pivotally supported lever, and a link, said link being connected to said valve by a ball and socket joint, substantially as set forth.

13. In a sound reproducer, a hollow body having a resonating chamber, and an equalizing chamber communicating through ports, said equalizing chamber being located on the exit side of said ports and having

a greater volume than said resonating chamber, a valve seated upon said ports, and means for operating said valve to vary the extent of opening of the ports, substantially as set forth.

14. In a sound reproducer, a hollow body having a resonating chamber, and an equalizing chamber communicating through ports, means for producing a flow of elastic fluid through said ports from said resonating chamber into said equalizing chamber, said equalizing chamber having sufficient volume to prevent excessive variation in the operating fluid pressure, a valve seated upon said ports, and means for operating said valve to vary the extent of opening of said ports, substantially as set forth.

15. In a sound reproducer, the combination of a hollow body having ports, means for producing a flow of elastic fluid there-through, and a valve operating by flexure to vary the extent of opening of the ports, said valve being weakened along the line of flexure, substantially as set forth.

16. In a sound reproducer, the combination of a hollow body having ports, means for producing a flow of elastic fluid there-through, and a valve plate secured at one edge and operating by flexure to vary the extent of opening of the ports, said plate being weakened along the line of flexure, substantially as set forth.

17. In a fluid pressure sound reproducer, a valve comprising a flexible plate weakened along its line of flexure by a groove, substantially as set forth.

This specification signed and witnessed this 21st day of March 1906.

ALEXANDER N. PIERMAN.

Witnesses:

DELOS HOLDEN,  
FRANK L. DYER.

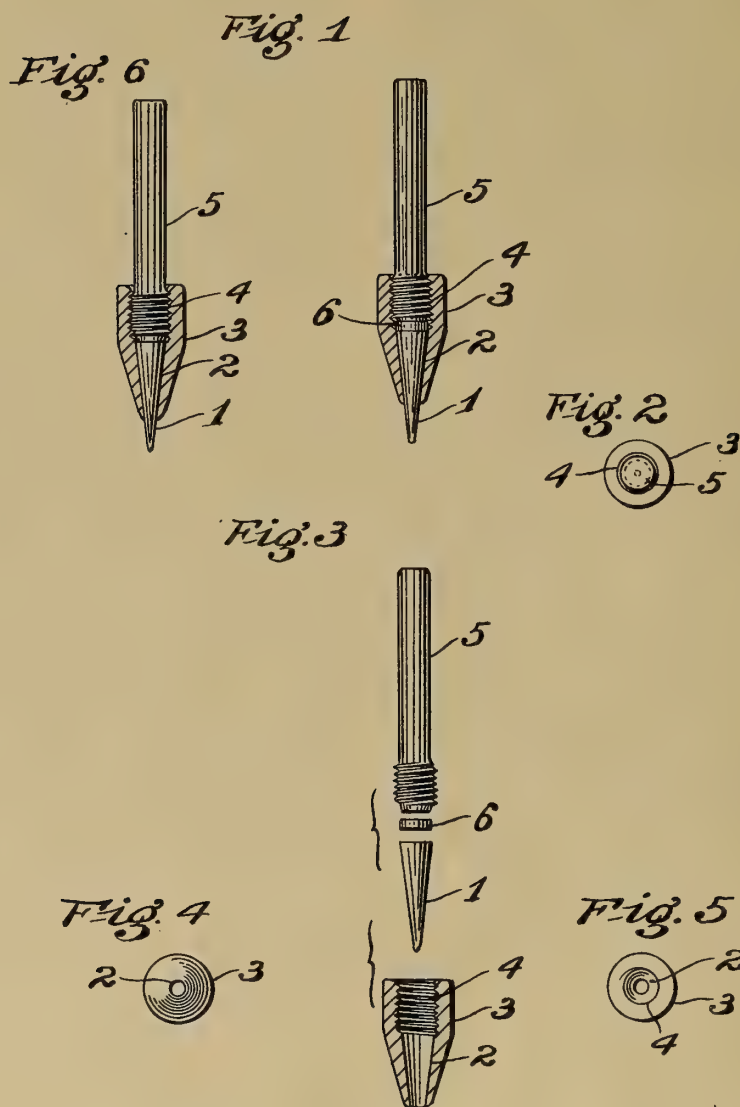


STYLUS OR NEEDLE FOR SOUND REPRODUCING MACHINES,  
#1,149,514-----G. H. Hiles,  
Patented-August 10, 1915.  
Filed-March 30, 1911.

G. H. HILES.  
 STYLUS OR NEEDLE FOR SOUND REPRODUCING MACHINES.  
 APPLICATION FILED MAR. 30, 1911.

1,149,514.

Patented Aug. 10, 1915.



Witnesses:  
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Inventor:  
*George H. Hiles*

# UNITED STATES PATENT OFFICE.

GEORGE H. HILES, OF LOS ANGELES, CALIFORNIA.

STYLUS OR NEEDLE FOR SOUND-REPRODUCING MACHINES.

1,149,514.

Specification of Letters Patent.

Patented Aug. 10, 1915.

Application filed March 30, 1911. Serial No. 618,010.

*To all whom it may concern:*

Be it known that I, GEORGE H. HILES, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Stylus or Needle for Sound-Reproducing Machines, of which the following is a specification.

An object of this invention is to minimize the wear on the record while reproducing therefrom and at the same time produce a clear, mellow tone from the record.

Another object is to minimize the scraping sound vibrations that the needle ordinarily transmits to the sound box due to the friction between the needle and the record.

A further object is to provide practically a permanent needle point of agate or other hard stone, so mounted as to minimize the liability of breakage and to be easily removable from its mounting in case it becomes desirable to replace the point.

In music, vibrations range from forty per second to a little over 4,000 per second, which is a fair example of the number of vibrations undergone by the stylus of a sound-reproducing machine. It is therefore evident that to properly transmit musical vibrations the stylus point and its mounting will have to be joined together in such manner that the stylus will withstand as many as 40,000 vibrations per second and will also withstand a jump within a thousandth part of a second from 4,000 to 40,000 vibrations per second.

An object of this invention is to provide in an efficient manner for the transmission to the diaphragm of sound waves registered on a record plate and for this purpose I provide a needle point fitting along the greater part of its length a taper seat in a socket of hard rubber and projecting but slightly below the socket and I also provide a stem of bone.

Other objects and advantages may appear from the subjoined detail description.

The accompanying drawings illustrate the invention.

Figure 1 is an enlarged side elevation of a stylus made in accordance with this invention. The socket is shown in vertical mid-section. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a view of the parts shown in Fig. 1 disassembled. Figs. 4 and 5 are bottom and top end views respectively of the socket shown in the preceding figures. Fig.

6 is a view analogous to Fig. 1 of the invention embodied in a different form.

The needle point 1 of some hard, smooth and durable material as agate, sapphire or the like and preferably taper or conical in shape tightly fits along the greater part of its length a taper seat 2 in the lower portion of a socket 3 below which the point slightly projects and which seat and socket are preferably of circular cross section and of smaller diameter at their lower than at their upper ends; said upper end of the socket being provided internally with a threaded portion of larger diameter than and in communication with the seat 2 and adapted to hold the threaded end of a cylindrical stem 5 which is adapted for connection to the usual sound-box, not shown, and the stem is screwed tightly against a non-metallic washer 6 that rests against the inner end of the needle point 1 as in Fig. 1, or may be screwed directly against the needle point and the washer omitted as in Fig. 6.

The socket and stem thus provide a suitable mounting for securely holding the needle point which may consequently be made to project but slightly below the socket in order to minimize the liability of breakage and the needle point can be readily removed through the threaded portion 4 and replaced by a new one when desired.

The socket 3 and stem 5, constituting the mounting, may both be of non-metallic substance such as hard rubber, fiber, bamboo, ivory or the like, alone or in combination, when a soft tone is desired; or may be, the one of metallic and the other of non-metallic substance when a louder tone is desired. The washer need only be employed when a non-metallic socket is used in combination with a metallic stem.

The seat 2 is sufficiently long to extend from the butt end of the needle point 1 to the lower end of the socket 3 so that the needle point will be held with maximum security against vibrating relatively to the socket along that portion of the point which is contained in the socket, and so that vibrations set up in the needle point by the sound waves registered in the record plate will be transmitted without variation to the socket along substantially the entire length of the needle point and thence undiminished through the stem 5 to the usual diaphragm lever arm, not shown.



The stylus when in operating position is at an angle to the vertical of thirty degrees more or less, as is customary in devices of this character, and, in order to minimize the length of the projecting portion of the point 5 1, the socket is considerably diminished in diameter at its lower end and tapers from thence upward in a conical portion as clearly shown in the drawings. This is important 10 in order that proper angularity may be given the stylus point which projects but a slight extent beyond the end of the socket.

I prefer to use fiber or hard rubber for the socket for the reason that I have discovered 15 after considerable experimentation that the needle point may be forcibly pressed into such fiber or rubber socket so as to be substantially integral therewith, even when as is usually the case the needle point has not 20 been ground to exactly fit the seat 2; and for the reason that the fiber or hard rubber socket has sufficient elasticity together with that degree of firmness necessary to obtain vibration of the needle point and socket in 25 unison even when the vibrations run as high as 40,000 per second. I prefer to use bone or a kindred substance for the stem for the reason that in the course of my experiments I have discovered that sound vibrations will 30 be transmitted through a bone stem from the socket to the lever arm, not shown, of the diaphragm without objectional diminu-

tion in volume and yet devoid of the harshness incident to the use of a metallic stem.

I do not broadly claim the use of a stone 35 needle point nor a non-metallic mounting for said point but by the combination hereinbefore described of a stone point such as agate, a hard rubber socket and a bone stem and by the specific construction specified of 40 the various parts I am enabled to obtain a maximum volume of clear tone devoid of harshness.

I claim:—

1. A vibration transmitting stylus com- 45 prising a fiber socket, a point seated along the greater part of its length in and projecting slightly from the socket, and a bone stem fixed in the socket and holding the point in place. 50

2. A vibration transmitting stylus comprising a firm elastic non-metallic socket, a point seated along the greater part of its length in and projecting slightly from the 55 socket and a bone stem screw-threaded into the socket and holding the point in place.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 25th day of March, 1911.

GEORGE H. HILES.

In presence of—

JAMES R. TOWNSEND,  
L. BELLE RICE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

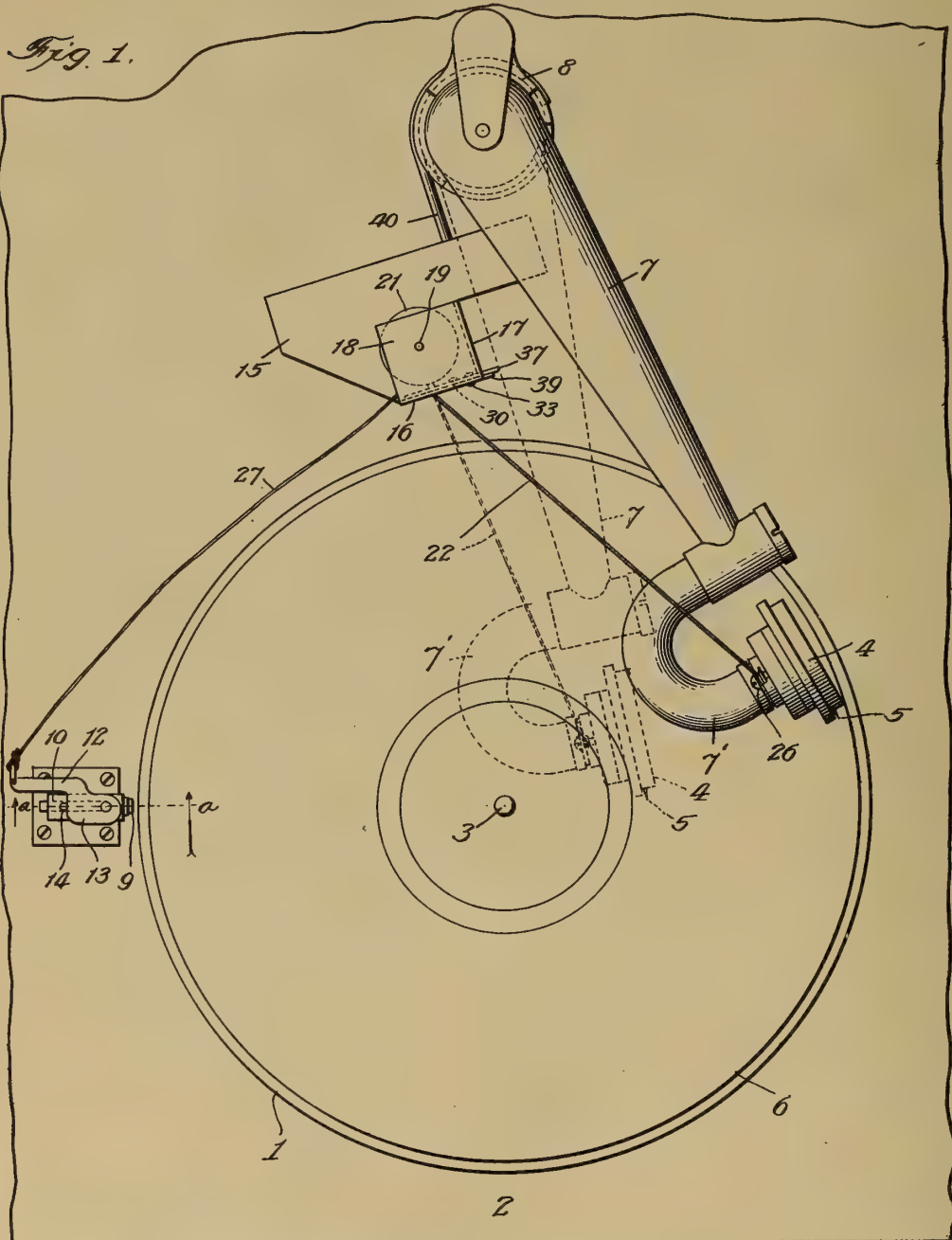
ATTACHMENT FOR TALKING MACHINES,  
# 1,149,804-----E. S. Antisdale,  
Patented-August 10, 1915.  
Filed-April 12, 1913.

E. S. ANTISDALE.  
ATTACHMENT FOR TALKING MACHINES.  
APPLICATION FILED APR. 12, 1913.

1,149,804.

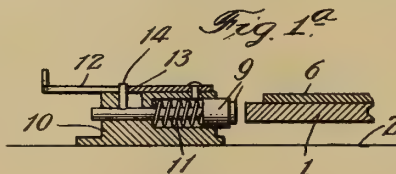
Patented Aug. 10, 1915.

2 SHEETS—SHEET 1.



Witnesses:

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Inventor:

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By *Pierce, Fisher & Copp*

*Attys.*



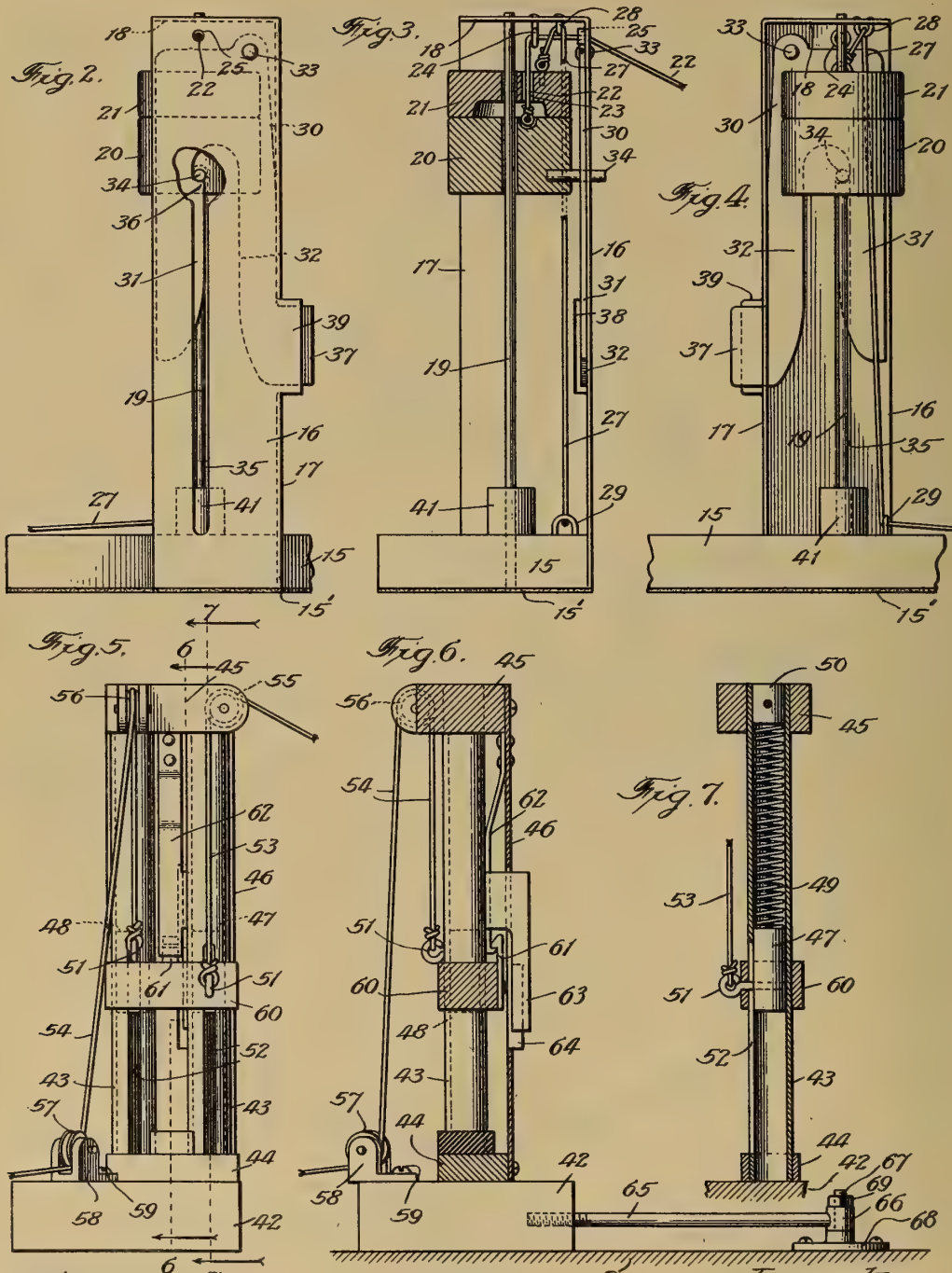


E. S. ANTISDALE.  
ATTACHMENT FOR TALKING MACHINES.  
APPLICATION FILED APR. 12, 1913.

1,149,804.

Patented Aug. 10, 1915.

2 SHEETS—SHEET 2.



Witnesses: 7  
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# UNITED STATES PATENT OFFICE.

EDWIN S. ANTISDALE, OF CHICAGO, ILLINOIS.

## ATTACHMENT FOR TALKING-MACHINES.

1,149,804.

Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed April 12, 1913. Serial No. 760,773.

*To all whom it may concern:*

Be it known that I, EDWIN S. ANTISDALE, a citizen of the United States, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Attachments for Talking-Machines, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The invention relates to attachments for talking machines and seeks to provide simple and effective means for automatically lifting the sound box and stopping the turn-table when the reproduction of the record on the turn-table is completed.

Another object of the invention is to provide such an attachment which can be readily applied to talking machines now in use.

The invention consists in the features of improvement hereinafter set forth, illustrated in the preferred form in the accompanying drawings and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a plan view of the upper parts of a talking machine with the improved attachment applied thereto. Fig. 1<sup>a</sup> is a detail section on lines *a-a* of Fig. 1. Figs. 2, 3 and 4 are front, side and rear elevations, respectively, of the improved attachment. In Fig. 3 the actuating weights are shown in section. Fig. 5 is a side elevation of a modified form. Figs. 6 and 7 are vertical sections on the lines 6-6 and 7-7 of Fig. 5.

The turn-table 1 of the talking machine is arranged above a horizontal top board or plate 2 and is rotatably sustained by a center shaft 3 which is operated in the usual manner by a suitable motor. A sound box 4 having a stylus 5 is arranged to move over a record 6 on the turn-table. The sound box is carried upon a shiftable sound box arm 7 which is swiveled at its rear end in a suitable bearing 8 to swing in a horizontal plane. The sound box is movable vertically to and from the record 6 and, for this purpose, in the form shown, it is mounted upon a U-shaped tube 7' which is horizontally swiveled to the outer end of the sound-box arm 7.

A brake is provided for arresting the

movement of the sound box. In the form shown, the brake comprises a plunger 9 which is slidably mounted within a bracket 10 fastened to the top plate 2. A spring 11 is arranged within the cavity of the bracket 10 and is coiled above the plunger 9. This spring is adapted to project the plunger into engagement with the edge of the turn-table 1. A brake controlling device or lever 12 pivoted on the casing 10, is provided with a cam shoulder 13 which is arranged to engage a pin 14 connected to the brake plunger to thereby hold the brake in released position against the tension of the spring. The parts thus far described are of any usual or suitable construction.

The improved attachment for automatically lifting the sound box and setting the brake when the reproduction of the record is completed, comprises a support movable over the face of the top 2 to and from the sound box arm, so that it can be adjustably positioned upon the top in accordance with the length of the record to be reproduced. A latch mounted on the support is arranged to be engaged and tripped by the sound box arm 7, and means on the support and controlled by the latch are arranged to lift the sound box and operate the brake controlled device or lever.

The support for the automatic attachment preferably comprises a base weight 15 which is preferably formed of lead. An upright frame or casing is mounted upon the base weight 15 and, in the forms shown in Figs. 1 to 4, inclusive, comprises front and side walls 16 and 17 and a top wall 18. These walls, in the form shown, are made of sheet metal and are suitably secured together and to the base 15. A vertical guide rod 19 is fixed at its lower end to the base 15 and at its upper end to the top wall 18.

A pair of actuating members or weights 20 and 21 are slidably mounted upon a rod 19. The lower weight 20 is preferably heavier than the upper weight 21 and is connected to the end of a cord 22. This cord 22 extends upwardly through an opening 23 in the weight 21 and thence horizontally through a guiding eyelet or staple 24 depending from the top wall 18 and through a flanged guide opening 25 in the front wall 16. The free end of the cord



extends to the sound box 4 and is fastened to a screw 26 threaded in an opening in the sound box. The length of the cord can be conveniently adjusted by winding it around the screw 26.

The weight 21 is connected to the end of a cord 27 which extends upwardly through a guiding eyelet or staple 28 on the top of the wall 18 of the upright frame and thence downwardly through a guiding staple 29 fixed to the base 15. The end of the cord 27 is connected to the brake controlling device or lever 12.

The actuating members or weights 20 and 21 are controlled by a common latch 30. In the form shown, the latch is made of sheet metal and is of inverted U-shape in outline and is provided with two depending legs or members 31 and 32. This latch is disposed against the inner face of the side wall 16 of the upright frame and is connected thereto at its upper end by a pivot pin 33. The pivot pin is arranged at one side of the center line of the latch 30, so that the latter is held in normal position by gravity with the edge of the leg or member 32 abutting against the side wall 17 of the upright frame. The lowermost weight is provided with a laterally projecting pin 34 which projects outwardly through a vertical slot 35 formed in the front wall 16. The leg or member 31 of the latch is provided at its upper end with a shoulder 36 which is arranged to engage the pin 34 and hold the actuating member or weight 20 in the elevated position shown in Figs. 2, 3 and 4. Inasmuch as the actuating weight or member 21 is arranged above the weight 20, it is also held in raised position by the common latch. The lower portion of the leg or member 31 of the latch is provided with a curved edge which is arranged to be engaged by the pin 34 to swing the latch to one side as the weights 20 and 21 are raised. In setting the device, the weights are raised by hand and at the end of the upward movement of the weights, the latch swings by gravity to the position shown in the drawings, and the shoulder 36 thereon engages the pin 34 to hold the actuating members or weights raised or in set position.

The other leg or member 32 of the latch is provided at its lower end with a laterally projecting lug 37 which extends outwardly through an opening 38 (see Fig. 3) in the side wall 17, and the end of the latch is arranged to be engaged by the sound box arm to thereby trip the latch and release the actuating members or weights 20 and 21. The upright frame of the support is preferably provided with a projecting guide lug 39 which is adapted to be engaged by the sound box arm 7 in positioning the attachment. The lug 37 is arranged adjacent and projects slightly beyond the guide lug 39.

In order that the automatic attachment be properly positioned with respect to the sound box arm, suitable means are preferably provided for guiding its movement over the top board or plate 2, so that the parts of the attachment shall move in paths concentric, or substantially concentric, with the pivot or bearing of the swinging arm 7. For this reason a guide rod 40 projects rearwardly from the base 15 and is provided with a curved rear end portion adapted to partially encircle the bearing 8 wherein the sound box arm 7 is swiveled.

In operation, the attachment is placed upon the top plate or board 2 of the machine with the curved rear end of the guide rod 40 in engagement with the bearing 8. In setting the device, the sound box arm 7 is moved against the guide lug 39 of the support and the support is moved over the surface of the top 2 with the sound box arm until the stylus 5 of the sound box is at the end of the sound groove of the record. The sound box arm is then swung away from the support, the weights or actuating members 20 and 21 are raised and are held in raised position by the latch 30, the brake plunger 9 is released by means of the controlling lever 12 and the sound box is placed in position with its stylus 5 at the beginning of the sound groove of the record. At the end of the reproduction of the record, the sound box arm 7, as indicated in dotted lines in Fig. 1, engages the projecting lug 37 of the latch and shifts it so that the shoulder 36 thereof is disengaged from the pin 34. The weights or actuating members 20 and 21 then fall. The weight 20, through the medium of the cord 22, automatically raises the sound box from the record, and the weight 21, through the medium of the cord 27, shifts the brake controlling device or lever 12 so that the brake is thrown into operation to stop the turn-table by means of its spring 11. To render the operation of the attachment noiseless, or substantially so, a buffer, in the form of a rubber block 41, is arranged at the lower end of the guide 19 in position to arrest the movement of the weight 20.

It should be noted that separate actuating members are provided for lifting the sound box and actuating the brake controlling device or lever 12. This is of importance, since in this way the throw of the weight 20, which raises and lowers the sound box, can be uniform. The attachment, however, must be adjusted to and from the sound box in accordance with the length of the record and, therefore, the distance between it and the brake, in the construction shown, necessarily varies. But inasmuch as the weight 21 is separate from and above the weight 20, its downward movement, necessary to shift the lever 12, can also vary.



The device is simple in construction, can be readily applied to talking machines now in use, can be readily adjusted and operates effectively and automatically to lift the sound box and stop the turn-table at the end of the reproduction of the record.

It is obvious that numerous changes may be made in the details set forth. For example, spring shifted, actuating members may be employed instead of weights. In the form shown in Figs. 5, 6 and 7, the base 42 carries two tubular uprights 43. These uprights are connected at their lower ends by a cross bar 44 and at their upper ends by a cross piece 45. A side wall or plate 46 is fixed at its upper and lower ends to the cross pieces 45 and 44, respectively. A pair of actuating members or plungers 47 and 48 are arranged within the tubes 43 and springs 49 within the tubes extend between the plungers and plugs 50 fixed in the upper ends of the tubes.

The plungers 47 and 48 are provided with laterally projecting pins 51 which extend through slots 52 in the tubes 43 and are connected, respectively, to the ends of the cords 53 and 54. The cord 53 extends upwardly over a guide roller 55 at the upper end of the supporting frame and, like the cord 22 in the form shown in Figs. 1 to 4, inclusive, is connected to the sound box. The cord 54 extends upwardly over a guide roller 56 at the upper end of the frame or casing and thence downwardly over a guide roller 57 and, like the cord 27, is connected to the brake controlling device or lever of the machine. In the construction shown, the guide roller 57 is mounted in a bracket 58 which is swiveled or pivotally connected by a screw 59 to the upper face of the base 42. A cross head 60 is slidably mounted upon the upright tubes 43 and is rigidly connected to the plunger 47 by the pin 51 projecting from this plunger. The pin 51 connected to the plunger 48 extends above the upper edge of the cross head 60 and, when the cross head is raised, the plunger 48 is necessarily raised with it. The parts, however, can move downwardly independently of each other and to different extents. On its rear face the cross head 60 is provided with a hook or dog 61 which is arranged to engage the hooked lower end of a latch 62. This latch is in the form of a leaf spring and is riveted at its upper end to the upper portion of the plate 46. The latch is provided with a depending portion 63 which extends outwardly through a slot in the plate 46. The lower end of the projection is arranged to be engaged by the sound box arm to shift the latch and release the cross head and actuating members or plungers 47 and 48. The plate 46 is provided with a rearwardly projecting guide lug 64 which, like the guide lug 39 of the

form previously described, is arranged to be engaged by the sound box arm in positioning or setting the automatic attachment upon the top plate of the talking machine. In this form, a rod 65 projects rearwardly from the base 42 and has an eye 66 at its rear end which engages a pivot pin 67. The pin 67 is mounted on a plate 68 that is fastened to the top 2 of the machine and a nut 69 on the pin engages the eye 66. The plate 66 may be arranged adjacent the bearing 8 of the sound box arm so that the attachment, as it is adjusted to and from the sound box, will always be maintained in such position that the arm will properly engage the lug 63. The operation of this form is similar to that previously described. Doubtless other changes may be made in the details set forth without departure from the essentials of the invention as defined in the claims.

I claim as my invention:

1. In a talking machine, the combination with the machine support, a rotatable turn-table thereon, a record on said turn-table, a sound box and a sound box arm adapted to be shifted by said record, of a brake for arresting said turn-table and said record, a controller for said brake, a support adjustable to and from said sound box arm, an actuating member for said brake controller shiftably mounted on said support, a latch on said support for holding said actuating member in set position, said support having a guide lug arranged to be engaged by said movable sound box arm for adjustably positioning said support, and said latch having a part adjacent and projecting slightly beyond said guide lug and against which said arm is shifted by said record at the end of the reproduction thereof to thereby trip said latch and release said actuating member, substantially as described.

2. In a talking machine, the combination with the machine support, a rotatable turn-table mounted thereon, a record on said turn-table, a sound box and a sound box supporting arm arranged to be shifted by said record, of a brake for arresting said turn-table and said record, mounted on said machine support, a controlling lever for said brake, a supplemental support adjustable to and from said sound box arm, an actuating member on said supplemental support, a flexible cord connecting said actuating member and said brake-controlling lever, and a latch on said auxiliary support for holding said actuating member in set position, said latch having a part against which said arm is moved by said record to thereby trip the latch and release said actuating member, substantially as described.

3. In talking machines, the combination with the machine support, a rotatable turn-table mounted thereon, a record on said turn-



table, a sound box and a sound box supporting arm arranged to be shifted by said record, a brake for arresting said turn-table and said record, a controller for said brake, an auxiliary support adjustable to and from said sound box arm, an actuating member for said brake controller shiftably mounted on said auxiliary support, a latch on said auxiliary support arranged to hold said actuating member in set position and against which said arm is moved by said record at the end of the reproduction thereof to thereby trip said latch, and means for guiding the adjusting movement of said auxiliary support, substantially as described.

4. In a talking machine, the combination with the machine support, a rotatable turn-table mounted thereon, a record on said turn-table, a sound box and a sound box supporting arm adapted to be shifted by said record, of a brake for arresting said turn-table and said record, a brake-controlling lever, a base weight adjustable in position on said machine support to and from said sound box arm, an upright frame on said base weight having a vertical guide, an actuating member for said brake controlling member slidable on said guide, and a latch arranged to hold said actuating member in raised position and against which said arm is moved by said record to thereby trip said latch, substantially as described.

5. In a talking machine, the combination with a machine support, of a turn-table rotatably mounted thereon, a record on said turn-table, a sound box and a sound box arm adapted to be shifted by said record, a brake for arresting said turn-table and said record, a brake control lever, a base weight freely adjustable on said machine support to and from said sound box arm, an upright frame on said base weight having a vertical guide, an actuating weight slidable on said guide, a cord connecting said weight to said brake controlling lever, said upright frame having guides for said cord, and a latch arranged to hold said weight in raised position and against which said arm is moved by said record to thereby trip said latch, substantially as described.

6. In a talking machine, the combination with the machine support, of a rotatable turn-table mounted on said support, a record on said turn-table, a sound box and a sound box arm adapted to be shifted by said record, a brake for arresting said turn-table and said record, an auxiliary weighted support adjustable on the top of said machine support to and from said sound box arm, an actuating member for said brake mounted on said auxiliary support, and a latch on said support arranged to hold said actuating member in set position and against which said arm is moved by said record at the end of the reproduction thereof to thereby trip

said latch and release said actuating member, said weighted, auxiliary support being adjustable on said machine support to and from said sound box arm to thereby position said latch relatively to said second box arm, substantially as described.

7. In talking machines, the combination with the machine support, a rotatable turn-table mounted thereon, a sound box and a sound box supporting arm movable over said turn-table, said sound-box being shiftable to and from said turn-table, of a weighted auxiliary support, an actuating member shiftably mounted on said support, a connection between said actuating member and said sound box for lifting the latter, said connection being arranged to move with said sound box as the record is reproduced, and a latch on said support arranged to hold said actuating member in set position and adapted to be tripped by said sound box arm at the end of the reproduction of a record, said weighted auxiliary support being freely adjustable on said machine support to and from said sound box arm to position said latch relatively to said sound box arm, substantially as described.

8. In talking machines, the combination with the machine support, of a turn-table rotatably mounted thereon, a sound box and a sound box arm movable over said turn-table, said sound box being movable to and from said turn-table, of a weighted auxiliary support, an actuating member shiftably mounted on said auxiliary support, a flexible cord connection between said actuating member and said sound box to raise the latter, and a latch on said auxiliary support arranged to hold said actuating member in set position and adapted to be engaged and tripped by said movable sound box arm, said weighted auxiliary support being freely adjustable on said machine support to and from said sound box arm to position said latch relatively to said arm, substantially as described.

9. In talking machines, the combination with the turn-table, movable sound box arm and sound box, of a support adjustable to and from said sound box arm, an actuating member on said support for lifting said sound box, and a latch on said support for holding said actuating member in set position, said support having a projecting guide lug arranged to be engaged by said sound box arm to position said support, and said latch having a part adjacent and projecting slightly beyond said guide lug and arranged to be engaged by said arm to thereby trip said latch and release said actuating member, substantially as described.

10. In talking machines, the combination with the turn-table, sound box arm and sound box, of a support adjustable to and from said sound box arm, said support hav-



ing a vertical guide, a weight slidable on said guide, a latch arranged to hold said weight in raised position and to be tripped by said sound box arm, and a flexible connection between said weight and said sound box for raising the latter, substantially as described.

11. In talking machines, the combination with the sound box arm and sound box of a base weight adapted to be adjusted in position on the top of the machine, an upright frame thereon having a vertical guide, an actuating member slidable on said guide, means for connecting said actuating member to the sound box of the machine to raise the same, and a latch arranged to hold said actuating member in raised position and to be tripped by the sound box arm of the machine, substantially as described.

12. In talking machines, the combination with the sound box arm and sound box, of a base weight adapted to be adjusted in position on the top of the machine, an upright frame thereon having a vertical guide, a weight slidable on said guide, a cord for connecting said weight to the sound box of the machine, said upright frame having a guide at its upper end for said cord, and a latch arranged to hold said weight in raised position and to be engaged and tripped by the sound box arm of the machine, substantially as described.

13. In talking machines, the combination with the turn-table, sound box arm and sound box, of a brake for said turn-table, a controlling device for said brake, a support adjustable on the top of the machine to and from said sound box arm and having a projecting guide lug arranged to be engaged by said arm in positioning said support, a latch on said support having a part arranged adjacent and projecting slightly beyond said lug and arranged to be engaged by said sound box arm to thereby trip said latch, and means controlled by said latch for shift-

ing said brake controlling device and lifting said sound box, substantially as described.

14. In talking machines, the combination with the turn-table, sound box arm and sound box, of a brake for said turn table, a controlling device for said brake, a support adjustable on the top of the machine to and from said sound box arm, two actuating members movably mounted on said support and connected respectively to said brake controlling device and to said sound box, and a common latch for controlling said actuating members adapted to be tripped by said sound box arm, substantially as described.

15. In talking machines, the combination with the turn-table, sound box arm and sound box, of a brake for said turn-table, a controlling device for said brake, a support adjustable to and from said sound box arm, said support having vertical guiding means, two actuating members slidable on said guiding means, flexible connections extending from said members to said brake controlling device and said sound box respectively, and a common controlling latch arranged to hold said actuating members in raised position and to be tripped by said sound box arm, substantially as described.

16. In talking machines, the combination with the turn-table, sound box arm and sound box, of a brake for said turn-table, a controlling device for said brake, a support adjustable to and from said sound box arm, said support having a vertical guide, two weights sliding on said guide, flexible cords connecting said weights to said brake controlling device and to said sound box respectively, and a latch for holding said weights in raised position arranged to be engaged and tripped by said sound box arm, substantially as described.

EDWIN S. ANTISDALE.

Witnesses:

J. G. ANDERSON,  
KATHARINE GERLACH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



RECORD DISK,  
#1,150,020-----A. Ettlinger,  
Patented-August 17, 1915.  
Filed-February 28, 1913.

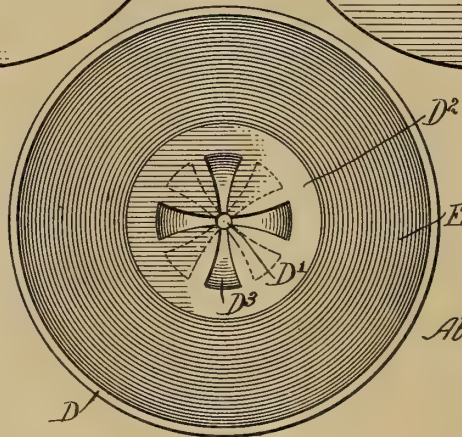
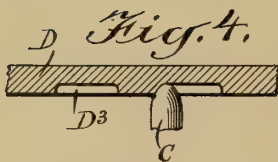
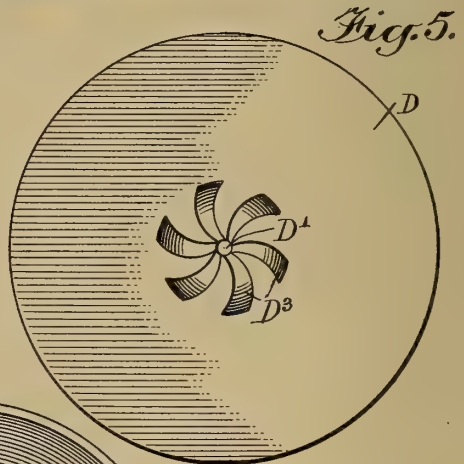
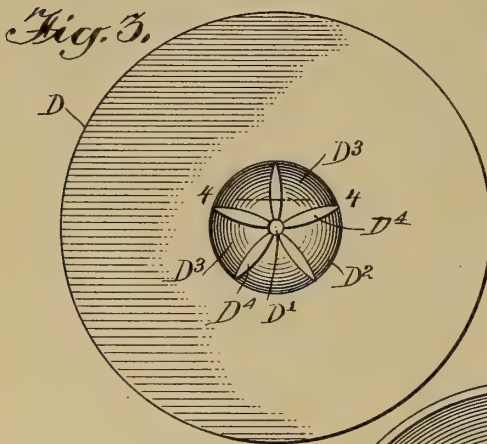
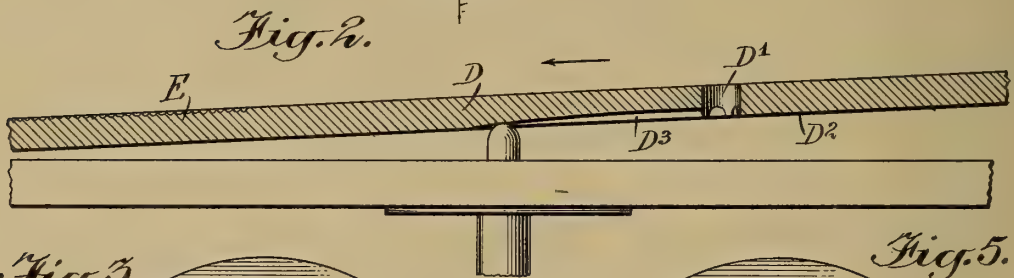
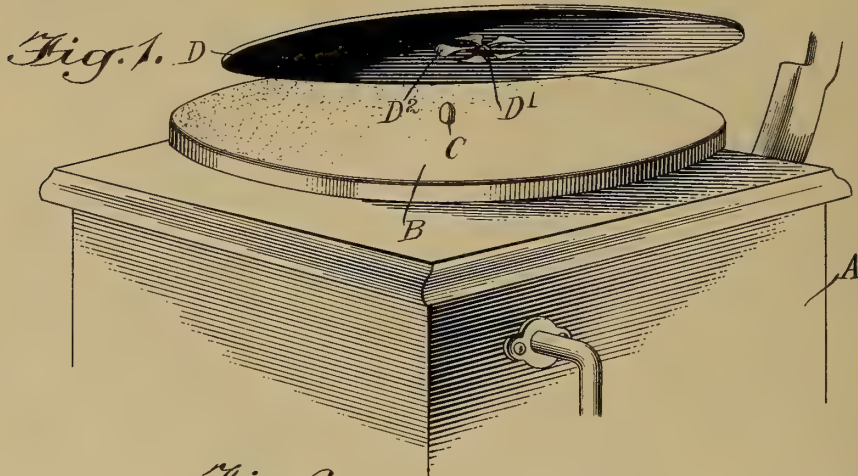


A. ETTLINGER.  
RECORD DISK.

APPLICATION FILED FEB. 28, 1913.

1,150,020.

Patented Aug. 17, 1915.



WITNESSES

*Geo. W. Naylor*  
*Rev. J. H. Porter*

INVENTOR  
*Abraham Ettlinger*  
BY *Mumford & Co.*  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

ABRAHAM ETTLINGER, OF NEW YORK, N. Y.

## RECORD-DISK.

1,150,020.

Specification of Letters Patent. Patented Aug. 17, 1915.

Application filed February 28, 1913. Serial No. 751,274.

*To all whom it may concern:*

Be it known that I, ABRAHAM ETTLINGER, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Record-Disk, of which the following is a full, clear, and exact description.

The invention relates to graphophones and similar machines, and its object is to provide a new and improved record disk provided with means for quickly and accurately centering the opaque record disk on the centering pin of the revolving platform of the graphophone.

In order to accomplish the desired result use is made of a plurality of grooves formed in the central portion of the record disk and leading to the usual central opening adapted to engage the centering pin of the revolving platform of the graphophone.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of a record disk shown in conjunction with a graphophone of ordinary construction; Fig. 2 is an enlarged sectional side elevation of the record disk showing the manner in which the disk is placed in position on the centering pin of the graphophone; Fig. 3 is a reduced face view of a record disk of modified form; Fig. 4 is an enlarged sectional side elevation of the same on the line 4-4 of Fig. 3, and applied to the centering pin of the revolving platform; and Figs. 5 and 6 are face views of other modified forms of the record disk.

A graphophone A of any approved construction is provided with the usual revolving platform B having a centering pin C adapted to be engaged by a central opening D' formed in the record disk D to be supported on the revolving platform B and carried around by the same during the time the stylus of the graphophone is in engagement with a spiral groove E formed in the face of the record disk D and possessing a sinusoidal surface in accordance with the sounds desired to be reproduced. The record disk D is provided with the usual central portion D<sup>2</sup> provided with the usual legends indicating the maker's name, the title and other matter, and this central portion D<sup>2</sup> is pro-

vided with a plurality of guide grooves D<sup>3</sup> leading to the central opening D'. The guide grooves D<sup>3</sup> may be of various shapes, as indicated in the drawings, but in the main the grooves D<sup>3</sup> gradually decrease in width on approaching the central opening D', and the grooves preferably increase in depth on approaching the central opening D', as plainly indicated in Fig. 2. The grooves are preferably radially disposed and are equally spaced apart, thus practically ornamenting the central portion of the record disk.

In the modified form shown in Figs. 3 and 4, the sides of the grooves D<sup>3</sup> are defined by radial arms D<sup>4</sup> arranged in the form of a star-like figure, the surfaces of the arms D<sup>4</sup> being flush with the face of the record disk.

In using the record disk the operator engages the central portion of the record disk with the centering pin C and a slight movement given to the disk by the operator readily engages one of the grooves with the centering pin C, and then the operator on moving the disk with the centering pin in contact with the groove finally guides the disk into central position relative to the centering pin C so that the opening D' engages the centering pin C.

It is understood that for double record disks the grooves are on both faces of the disk, while for single record disks it is only necessary to provide grooves at the under face of the disk.

Although I have shown several forms of grooves in the drawings, it is evident that I do not limit myself to the particular shape shown, as the same may be varied without deviating from my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. As an article of manufacture, a sound reproducing record disk provided with a central opening and with guide grooves leading to and grouped around the central opening.

2. As an article of manufacture, a sound reproducing record disk provided with a central opening and with guide grooves leading to and grouped around the said central opening, the said grooves gradually diminishing in width as they approach the central opening.

3. As an article of manufacture, a sound



reproducing record disk provided with a central opening and with guide grooves leading to and grouped around the said central opening, the said grooves gradually increasing in depth as they approach the central opening.

4. As an article of manufacture, a sound reproducing record disk provided with a central opening and with guide grooves disposed radially and grouped around and leading to the said central opening.

5. As an article of manufacture, a sound reproducing record disk provided with a central opening and with guide grooves at the central portion of the disk and leading to and grouped around the said central opening.

6. As an article of manufacture, a sound reproducing disk provided with a central opening and with a plurality of radial guide grooves having relatively narrow, deep inner ends, which lead to and are grouped

around the central opening, and having relatively shallow outer ends merging into the surface of the disk, the sides and bottoms of the grooves being gradually tapered between their said ends, all for the purpose described.

7. As an article of manufacture, a sound reproducing disk provided with a central opening and with a plurality of guide grooves grouped around the center thereof, radially of and leading to the said central opening, each of said grooves being gradually tapered in width and depth from one end to the other and being curved in its length, all for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

New York, N. Y., February 25th, 1913.

ABRAHAM ETTLINGER.

Witnesses:

R. W. NARES,

FREDERIC B. LOTT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

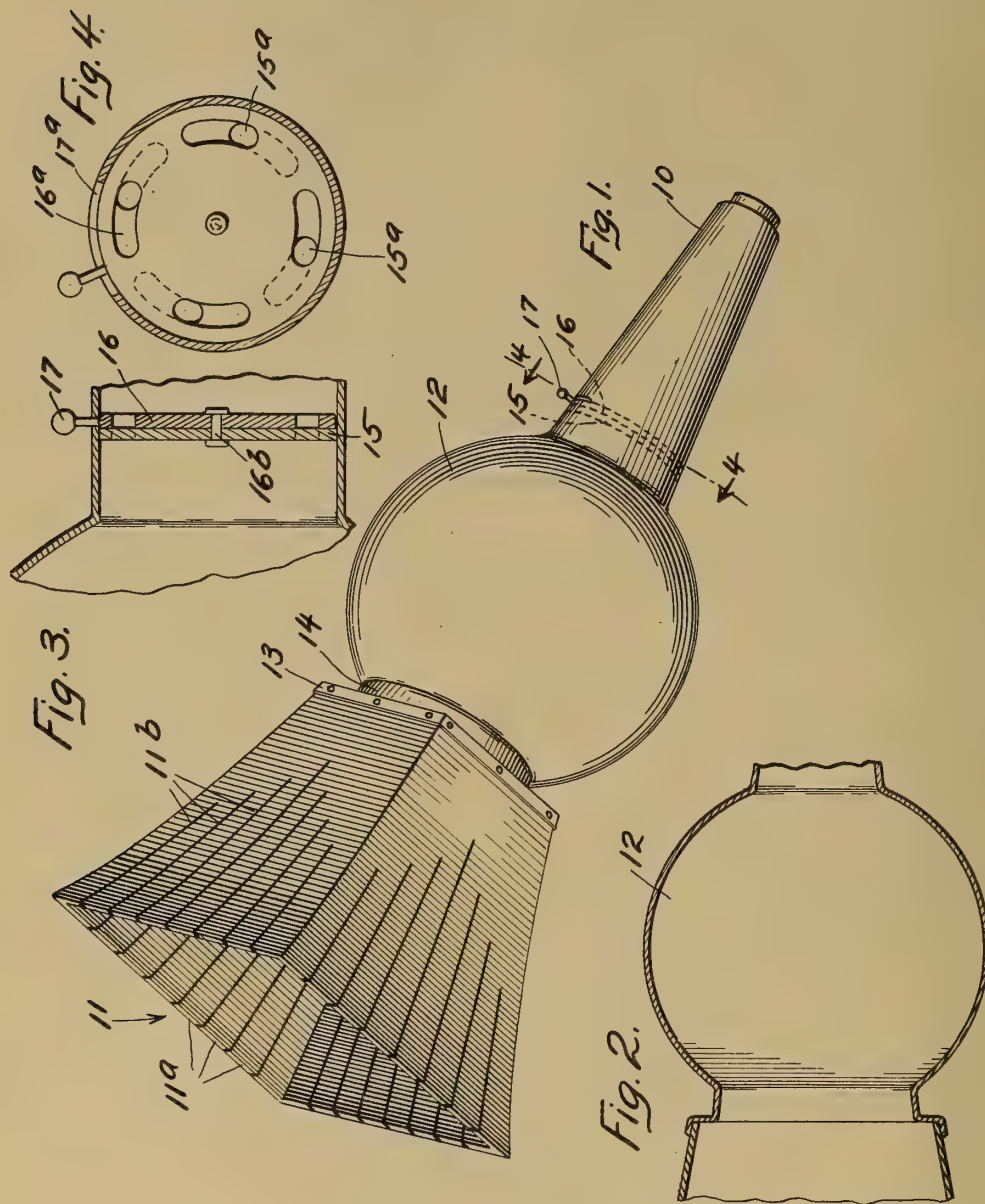


HORN FOR PHONOGRAPHS.  
#1,150,215-----A. P. McArthur & E. Fletcher,  
Patented-August 17, 1915.  
Filed-November 1, 1911.

A. P. McARTHUR & E. FLETCHER.  
HORN FOR PHONOGRAPHS.  
APPLICATION FILED NOV. 1, 1911.

1,150,215.

Patented Aug. 17, 1915.



Witnesses:

*C. Durnap*

*Henry A. Parks*

By

*Sheridan Wilkinson, Scott & Richmond*

Inventors:

*Alexander P. McArthur*

*Elmer Fletcher*

*Attys*

# UNITED STATES PATENT OFFICE.

ALEXANDER P. McARTHUR AND ELMER FLETCHER, OF CHICAGO, ILLINOIS, ASSIGNORS  
TO ORATOR MANUFACTURING COMPANY, A CORPORATION OF ILLINOIS.

## HORN FOR PHONOGRAPHS.

1,150,215.

Specification of Letters Patent. Patented Aug. 17, 1915.

Application filed November 1, 1911. Serial No. 658,064.

*To all whom it may concern:*

Be it known that we, ALEXANDER P. McARTHUR and ELMER FLETCHER, citizens of the United States, residing at 431 South Dearborn street, Chicago, Illinois, have invented certain new and useful Improvements in Horns for Phonographs, of which the following is a specification.

The object of our invention is to provide a horn for phonographs which will control the sound waves in such a manner as to prevent what may be termed "blasting" of said sound waves. In this way we produce a sound having a pure tone in which the harsh and unpleasant features are largely, if not wholly, eliminated.

The objects of our invention will be made more fully apparent in the following specification taken in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of a horn comprising our improvements; Fig. 2 is a longitudinal section of the central portion thereof; Fig. 3 is a sectional view of the damper or modulator, taken along the axis thereof; and Fig. 4 is a cross section, taken along the line 4—4 of Fig. 1, showing details of said damper.

In the drawings the device will be seen to consist of a conduit for sound waves having a tapered form, the smaller end of which is round and conical, as shown at 10. The larger end is square or rectangular, as shown at 11. The intermediate portion 12 is considerably enlarged, and is preferably given a spherical form. The smaller conical portion 10 opens into the enlarged portion 12 at one side, and the rectangular portion is joined to said enlarged portion at the other side, preferably through an intermediate round or conical portion 14.

The angular or square portion 11 is made preferably of wood, and is joined to the intermediate portion at 13 by means of suitable flanges and fastening devices on said intermediate portion. The intermediate and conical portions extending from the flanges 13 to the smaller end 10 are preferably made of one piece of metal.

The smaller conical portion is provided with a cross wall 15, in which apertures 15<sup>a</sup> are located for the passage of the sound waves. These apertures may be reduced in their extent by the damper 16, which is pro-

vided with similar apertures 16<sup>a</sup>. The damper 16 is pivoted centrally at 16<sup>b</sup> to the cross wall 15. A handle 17, extending through a slot 17<sup>a</sup> in the wall of the device, permits adjustment of the damper with relation to the apertures in the wall. By this means said apertures may be opened to the extent desired. The said damper is preferably located quite close to the enlarged portion 12, in order that the divided sound waves, passing through it may be re-united and expand in said chamber. The portion of the conduit 14 permits the sound waves to flow uninterruptedly between the chamber 12 and the angular portion 11.

The walls of the large end 11 of the horn are divided into longitudinal tongues 11<sup>a</sup> of various lengths. These tongues may be made by cutting slits 11<sup>b</sup> in the walls thereof. They may also be made by attaching strips side by side to the body of the horn. These slits break up the continuity of the walls of said outer end and prevent the amplification of the harsh and undesirable portions of the sound. The various lengths of tongues prevent them getting in tune with each other and amplifying said harsh portions of the sound.

The damper directs, modifies and controls the sound waves in such a way as to prevent the blasting of the sound. Its harsh or undesirable features are thereby checked, and the expansion of the waves in the chamber 12 causes a further softening and purifying of the tone.

The horn is constructed of the separate pieces in such a manner as to permit giving it the desired shape required in sounding-board vibrators.

While we have described our invention more or less precisely as regards the details of construction, we do not wish to be limited thereto unduly.

We contemplate changes in the form and proportion of the parts and the substitution of equivalents as circumstances suggest or render expedient without departing from the spirit of our invention.

We claim:—

1. In a conduit for sound waves, a wall across said conduit having apertures, means for regulating the extent of opening of said apertures, and a sound chamber in said conduit having larger dimensions than the ad-



jaacent portions of said conduit, a portion of the walls of said conduit being formed into tongues.

2. A conduit for sound waves, a portion  
5 of said conduit having a conical form and another portion having a pyramidal form, said conical portion having an enlarged portion adjacent its union with said pyramidal portion.

10 3. A conduit for sound waves having a metallic portion of circular cross-section, and a non-metallic portion joined thereto, said metallic portion having an enlarged portion forming a chamber.

15 4. A conduit for sound waves having a metallic portion and a non-metallic portion joined thereto, said metallic portion having an enlarged portion forming a chamber, the walls of said non-metallic portion being  
20 formed into tongues.

5. A conduit for sound waves having walls composed of tongues or bars independent of each other in substantially parallel relation.

25 6. A conduit for sound waves having walls composed of tongues or bars independent of each other in substantially parallel relation, said bars having different lengths.

30 7. A conduit for sound waves having walls composed of tongues or bars independent of each other in substantially parallel

relation, said bars being fixed to the body of said conduit at one end and free at the other.

8. In a conduit for sound waves, a conical  
35 portion communicating at its larger end with an enlarged spherical portion, said enlarged spherical portion communicating on the side thereof opposite said conical portion with a second conical portion, and a  
40 pyramidal portion with which said last mentioned conical portion communicates.

9. In a conduit for sound waves, a conical  
portion communicating at its larger end with an enlarged spherical portion, said en-  
45 larged spherical portion communicating on the side thereof opposite said conical portion with a second conical portion, said last mentioned conical portion communicating with a pyramidal portion, a cross wall in  
50 said first mentioned conical portion adjacent to said enlarged spherical portion, apertures in said cross wall, and means for regulating the extent of opening of said apertures.  
55

In testimony whereof, we have subscribed our names.

ALEXANDER P. McARTHUR.  
ELMER FLETCHER.

Witnesses:

CHARLES E. BURNAP,  
HENRY A. PARKS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH PATENT.

SOUND REPRODUCING MACHINE,  
#1,150,346-----W. N. Dennison,  
Patented-August 17, 1915.  
Filed-March 12, 1907.  
Renewed-January 20, 1915.

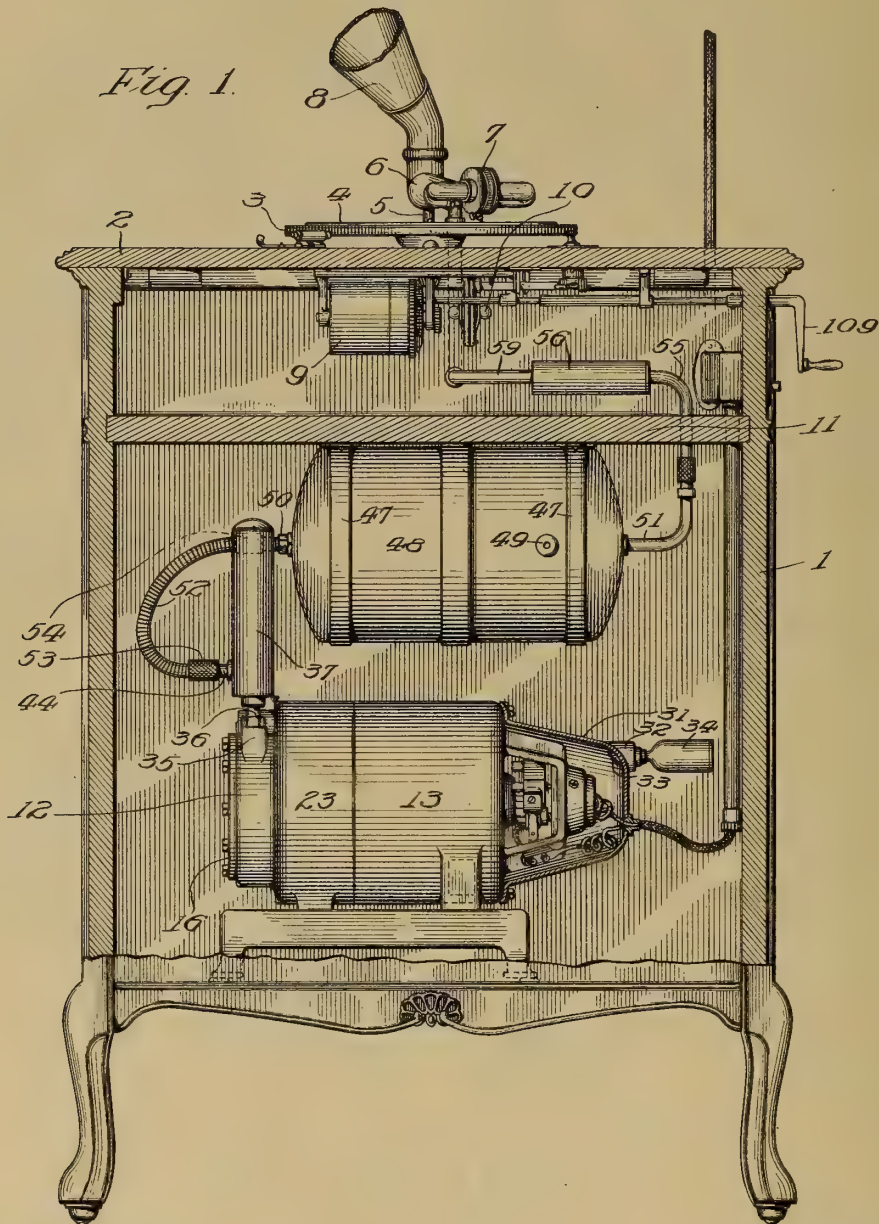
W. N. DENNISON.  
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAR. 12, 1907. RENEWED JAN. 20, 1915.

1,150,346.

Patented Aug. 17, 1915.

4 SHEETS—SHEET 1.



WITNESSES:  
*W. J. Hartman.*  
*A. J. Gardner.*

INVENTOR  
*Wilburn N. Dennison.*  
BY *John P. Kelly.*  
ATTORNEY.





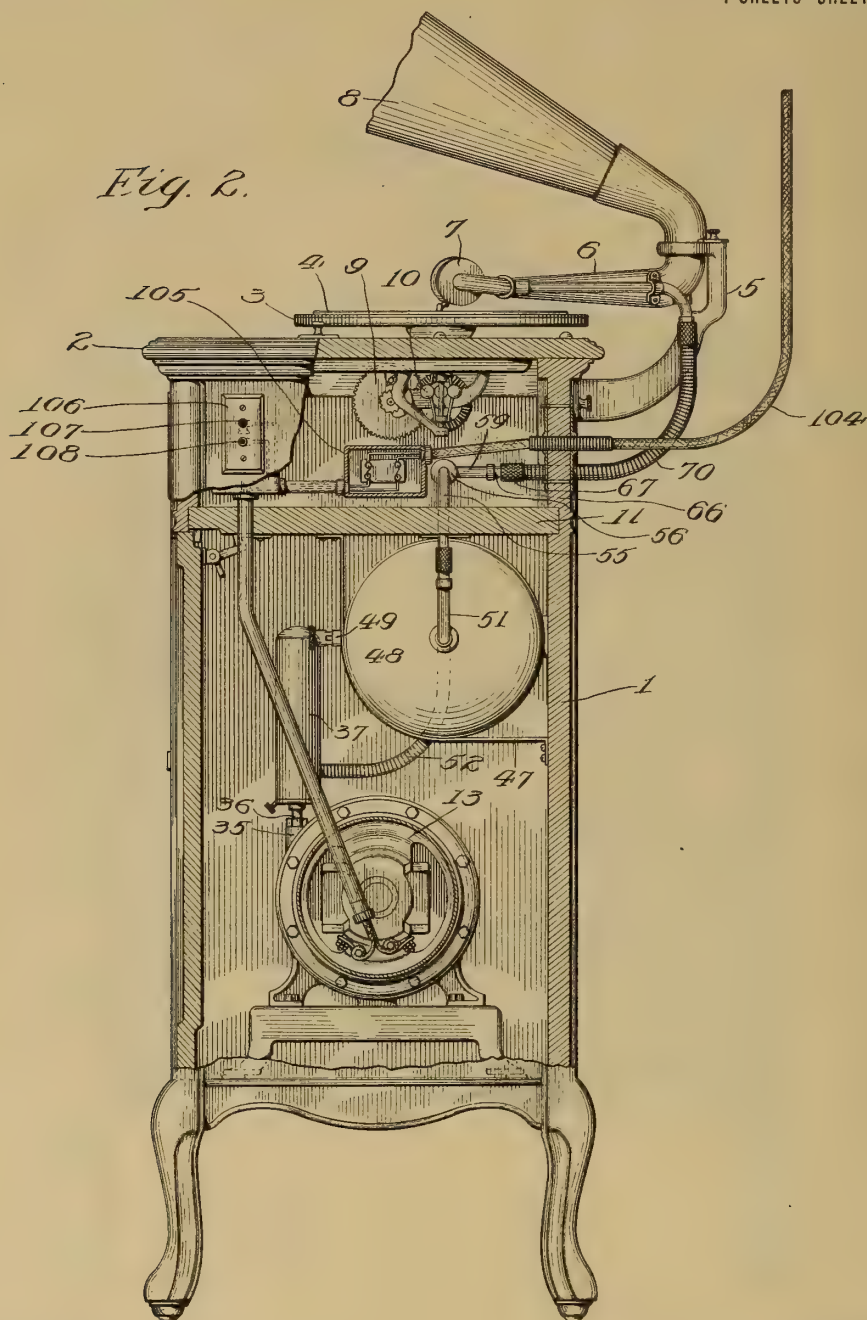
W. N. DENNISON.  
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAR. 12, 1907. RENEWED JAN. 20, 1915.

1,150,346.

Patented Aug. 17, 1915.

4 SHEETS—SHEET 2.



WITNESSES:  
*F. J. Hartman*  
*A. J. Gardner*

INVENTOR  
*Wilburn N. Dennison*  
BY *John P. Kelly*  
ATTORNEY.





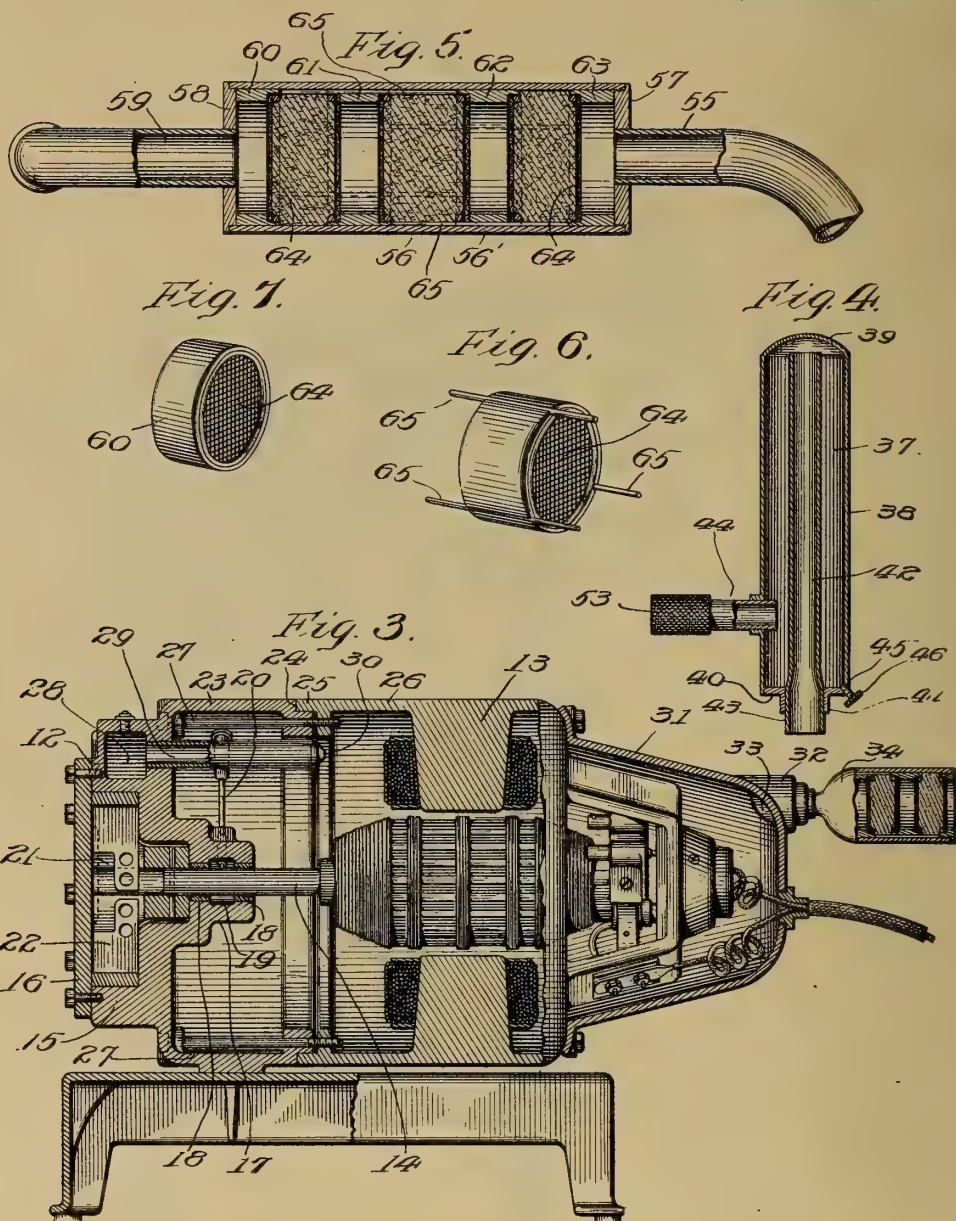
W. N. DENNISON.  
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAR. 12, 1907. RENEWED JAN. 20, 1915.

1,150,346.

Patented Aug. 17, 1915.

4 SHEETS—SHEET 3.



WITNESSES:  
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*A. J. Gardner*

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*Wilburn N. Dennison*  
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W. N. DENNISON.  
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAR. 12, 1907. RENEWED JAN. 20, 1915.

1,150,346.

Patented Aug. 17, 1915.

4 SHEETS—SHEET 4.

Fig. 8.

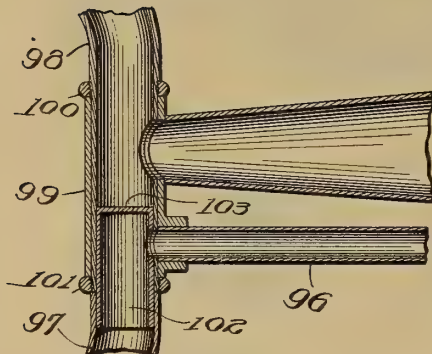


Fig. 9.

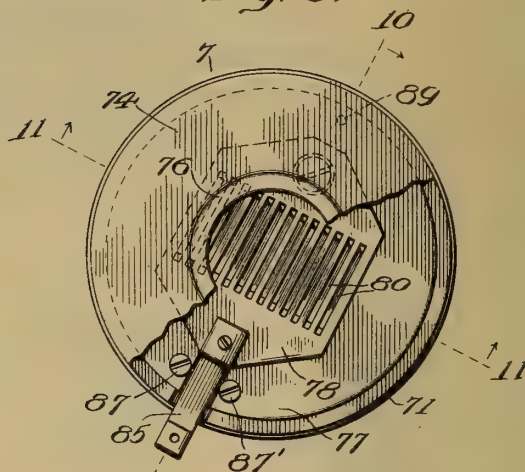


Fig. 10.

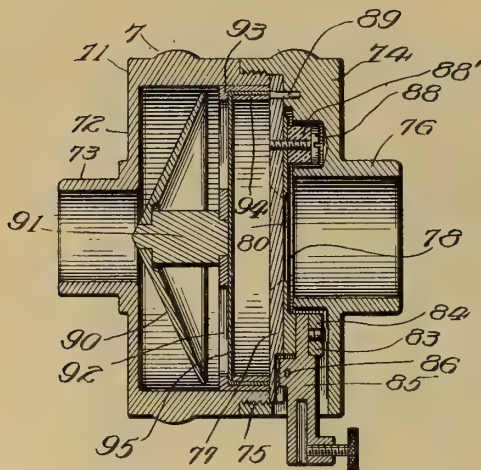
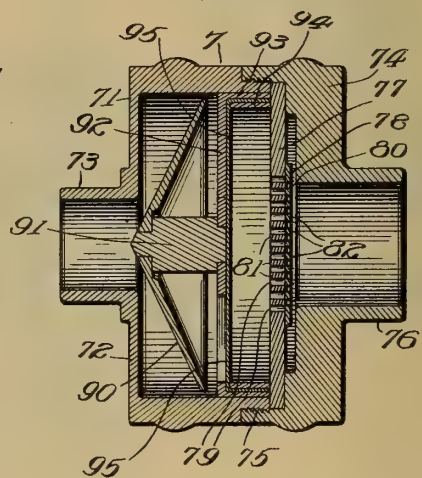


Fig. 11.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## SOUND-REPRODUCING MACHINE.

1,150,346.

Specification of Letters Patent.

Patented Aug. 17, 1915.

Application filed March 12, 1907. Serial No. 361,979. Renewed January 20, 1915. Serial No. 3,407.

*To all whom it may concern:*

Be it known that I, WILBURN N. DENNISON, of the borough of Merchantville, county of Camden, and State of New Jersey, have  
5 invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and complete disclosure.

This invention relates to improvements in  
10 sound reproducing machines, in which sound waves are impressed upon a fluid current by means moving in accordance with a sound record.

One object of the invention is to combine  
15 in a single compact, convenient structure, mechanism for reproducing from a sound record undulations in a current of air, and means for supplying a steady current of purified air to be acted upon.

A further object is to provide a talking  
20 machine of the character above described with a sound box and connections, an air purifier, a separator and a direct connected electrically driven air blower which will be self cooling and noiseless in operation.

Further objects will be understood as the  
invention is further disclosed, the purpose as a whole being to provide a machine by which sounds will be reproduced from records with greater clearness, distinctness and  
30 accuracy than has heretofore been attained.

In the accompanying drawings Figure 1 is a fragmentary front elevation of a talking machine constructed in accordance with this  
35 invention; Fig. 2 a fragmentary side elevation of the same; Figs. 3, 4 and 5 are enlarged fragmentary elevations partly in longitudinal vertical section of details of the same; Figs. 6 and 7 are perspective views of  
40 details of the same; Fig. 8 is an enlarged central horizontal section of a portion of the same; Fig. 9 a fragmentary end view of a portion of the same; Fig. 10 a sectional view taken on line 10—10 of Fig. 9; and  
45 Fig. 11 a sectional view taken on line 11—11 of Fig. 9.

Referring to the drawings, one embodiment of this invention comprises a cabinet 1, upon the top 2 of which is mounted a  
50 turntable 3 for supporting the usual or any suitable sound record 4. Depending from a bracket 5 secured exteriorly to the rear side of the cabinet is a swinging hollow tapering

sound box arm 6 carrying at its inner end a  
sound box 7 arranged to cooperate with the  
55 sound record 4. The swinging sound box arm opens upwardly at its larger end into a sound amplifying horn 8 carried by the bracket 5. Depending within the cabinet from the top 2 is the usual or any suitable  
60 motor or actuating mechanism 9 arranged to rotate the turntable 3. The motor 9 is provided with the usual or any suitable governor 10 for controlling its speed. The cabinet 1 is preferably divided into an upper  
65 and lower compartment by the horizontal partition 11, which is spaced below the actuating mechanism 9.

For supplying the sound box 7 with a  
current of air there is provided an air compressor, which is arranged within the lower  
70 compartment of the cabinet and which is preferably mounted upon the floor of the cabinet. This compressor comprises, as shown in Fig. 3, a rotary blower 12 driven  
75 by an electric motor 13, the armature shaft 14 of the motor being extended to form the driving shaft of the blower. The blower consists of a cylinder 15, provided at its  
80 outer end with a removable cylinder head 16, and having an eccentrically extended inner end 17 forming bearings 18 for the said motor shaft. Between the said bearings 18 is an annular oil chamber 19 fed by an oil  
85 duct 20.

The cylinder of the blower is arranged  
eccentrically with respect to the motor shaft 14, and within the cylinder is carried upon  
the end of the said shaft a piston wheel 21  
90 which is provided with radial slots and with piston blades 22 slidably mounted in the slots.

The blower 12 is provided with an inwardly extending cylindrical casing 23 corresponding in diameter to the diameter of  
95 the casing of the motor, and having an annular recess 24 upon its inner edge to receive the flanged edge 25 of the motor casing 26 and is held against the motor casing by means of bolts 27. Upon its upper side  
100 the blower 12 is provided with an elongated inlet chamber 28, and with an inlet duct 29 leading into said chamber from the motor chamber. The outer end of said inlet duct is reduced and provided with an orifice 30  
105 of less area than the transverse area of the



main portion of the duct. The motor is entirely inclosed, and its outer end is covered with an air tight cap 31, provided with an outwardly extending lug 32 having an inlet duct 33 therethrough, over which is mounted an air filter 34, the details of which will be more fully described hereinafter. This arrangement and construction is such that all air that enters the blower must come first through the filter passing over the armature of the motor, and so on into the inlet duct 29 leading into the inlet chamber of the blower. Thus the air is first purified of all dust and foreign matter before it enters the motor casing, and being drawn around the magnet coils and over the armature of the motor, as it passes through the motor, it has the very desirable effect of keeping the motor cool.

In operating this machine the motor is run at a comparatively high speed, which, on account of the small opening into the inlet duct of the blower, forms a partial vacuum in the inlet duct and inlet chamber of the blower. It has been found that by thus constructing and operating the blower a much steadier flow of air is obtained and the operation of the blower is rendered practically noiseless.

For removing from the air any oil or similar matter taken up by the air in its discharge through the blower, the discharge pipe 35 of the said blower terminates in a thimble 36 which is screw threaded therein and leads into a separator 37. This separator 37 as shown in Fig. 4, comprises an outer tube 38 having an upper closed and rounded end 39 integral therewith and a lower end 40 formed separately and securely fastened into the outer tube. Passing through the said lower end and held in place by an outwardly extending flange 41 is an inner tube 42 which extends centrally and longitudinally of the outer tube and terminates at its upper end in close proximity to the upper rounded end of the outer tube. The inner tube extends downwardly a short distance beyond the end of the outer tube and is provided with an enlarged lower end 43 adapted to fit over the taper end of the said thimble 36 of the discharge pipe. Extending horizontally through the outer tube near the lower end thereof is the outlet pipe 44 terminating outwardly in a tapered end and projecting inwardly beyond the inner surface of the outer tube. A hole 45 closed by a screw 46 is provided in the lower end of the separator whereby the separator may be emptied.

For equalizing the pressure of the air after it leaves the separator 37, there is provided a pressure equalizer, which is located above and upon one side of the separator and is secured against the under side of the partition 11 and against one side of the

cabinet by metal bands 47. This equalizer consists of a tank 48 provided with a safety valve 49, an inlet pipe 50 and an outlet pipe 51. The said inlet and outlet pipes have tapered outer ends adapted to fit into connections. A short flexible tube 52 provided with terminal sockets 53 and 54 connects the outlet pipe 44 of the separator to the said inlet pipe 50 of the equalizer.

For purifying the air after it has left the pressure equalizer there is located within the upper compartment of the cabinet and connected to the outlet pipe of the equalizer by a downwardly turned pipe 55 which passes through the partition of the cabinet, a second air filter 56, similar in construction to the filter 34 hereinbefore mentioned. This air filter 56 comprises as shown in detail in Figs. 5, 6 and 7, an outer tube 56, provided with ends 57 and 58 having inlet and outlet pipes connected thereto. Within the cylinder are secured a series of bushings 60, 61, 62 and 63. The bushings 60 and 63 occupying the ends of the cylinder are formed as shown in Fig. 7, each having a wire screen 64 covering one end thereof. The intermediate bushings 61 and 62 are formed as shown in Fig. 6 and have secured longitudinally thereto spacing bars 65 which are riveted into slots provided therefor in the outer surfaces of the bushings, and extend in each direction therefrom, the length of the bar outside the bushings being equal to the width of the space desired between the bushings. When the bushings are positioned within the cylinder the ends of the bars of one bushing rest against the edges of the adjoining bushings to hold the bushings in the desired relationship. Each end of these intermediate bushings is covered with a wire screen and the spaces between the screens of adjoining bushings are filled with cotton or other similar material for filtering the air. One end 57 of the cylinder is held in its position by screw threads, and is readily removable so that the filter may be taken apart for cleaning.

The outlet pipe 59 of the filter extends for a short distance in the line of the axis of the filter horizontally and then turns at right angles, and terminates within the casing in a taper end 66 adapted to fit in a socket 67 of a flexible pipe 70 which conducts the air to the sound box.

The details of the sound box used in this construction are shown in Figs. 8, 9, 10 and 11 where it is seen that the sound box comprises a cylindrical casing 71 provided with an end 72 integral therewith and having a tubular extension 73 coaxial therewith forming an inlet for the sound box. The opposite end of the cylindrical casing 71 is provided with a cap or cover 74 which is screw threaded thereon by means of an internal thread 75 engaging in correspond-



ing external threads upon the casing 71. The cap 74 is provided with a tubular extension 76 coaxial therewith and forming an outlet for the sound box.

5 In an annular groove between the sound box casing 71 and its cap 74 is held, in a fixed position, a flat circular disk or valve seat 77 which forms a seat for a valve 78. The disk or valve seat 77 is provided centrally with a series of parallel oblong rectangular ports 79. The valve 78 consists of a thin normally flat flexible plate of metal and is provided with a series of slots 80 corresponding in width to the thickness of the bridges 81 between the ports in the valve seat, and the valve is so constructed and arranged that normally the bridges 82 between the ports of the valve just cover the ports in the valve seat.

20 The valve 78 is provided on its lower side with a lug 83 in an aperture in which is securely fastened the reduced upper end 84 of a stylus bar 85. The cap of the sound box is recessed to permit the free movement of the stylus bar, and the stylus is mounted to oscillate in a plane perpendicular to the valve upon a transverse spring member 86, which is secured at its ends to the stationary valve seat by means of screws 87 and 87'.

30 To hold the valve 78 yieldingly against its seat under a fluid pressure a headed screw 88 passes loosely through a hole in the free end of the valve and is threaded into the valve seat. A spring, or rubber washer 88' surrounds the screw 88 between the head of the screw and the surface of the valve. A suitable recess is provided in the cap of the sound box to receive the screw and washer. To hold the valve seat securely in position with respect to the sound box casing when the cap of the casing is being screwed into position, a positioning pin 89 is provided extending through the valve seat and into the cap.

45 Within the casing, between the inlet side of the sound box and the valve, is situated a conical air spreader and distributor 90, the outer diameter of which is slightly less than the inner diameter of the casing. This spreader is mounted upon a central stud 91 supported by radial arms 92 carried by a ring 93 fitting snugly within the case and abutting against the said fixed member of the valve. Within this ring 93 and against the radial arms 92, by means of an inner ring 94, is secured a closely woven silk diaphragm 95. This diaphragm acts as a filter and pressure regulator.

50 The sound box is connected at its inlet to a supply tube 96 by means of a U shaped tube 97 the inner end of which fits snugly over the tubular extension 73, forming the inlet of the sound box. The supply pipe 96 extends rearwardly close to the sound box arm 6 and substantially parallel to the axis

thereof and is rigidly connected to the sound box arm in any suitable manner. The rear portion of this tube 96 terminates in one-quarter of a turn downwardly to receive the upwardly projecting end of the flexible tube 70. At its outlet the sound box is connected to the taper sound arm 6 by means of a U shaped tube 98 the inner end of which fits snugly over the tubular extension 76 forming the outlet of the sound box. The outer ends of these U tubes are pivotally connected to a sleeve 99, the said tube 98 extending through said sleeve and being provided with the collars 100 and 101 at opposite ends of the sleeve respectively to hold the tube rotatively in position. A short inner tube 102 having an inner closed end 103 fits tightly within the outer end of said tube 98 thus forming an articulated joint between the supply tube, 96 and the sound box 73 and projects beyond the end of said sleeve 99. The said U tube 97 fits tightly over the projecting end of the said inner tube 102 and the said closed end 103 forms a partition between the U tube 97 and the U tube 98. Upon one side of this partition the sleeve is provided with an aperture over which is mounted the tapering arm 6 leading into the amplifying horn. Upon the other side of the partition the sleeve is provided with an aperture into which is inserted the end of the supply tube 96. Apertures are provided through the tubes within the sleeve which register with the apertures in the sleeve when the sound box is in its operative position. When the sound box is raised from the record in a vertical plane the U tubes revolve with respect to the sleeves bringing their apertures out of register with the apertures in the supply pipe and the tapering arm thereby preventing the passage of the current of air through the sound box. This feature presents a convenient means of preventing a waste of air pressure when records are being changed and when the sound box is not in use.

In the operation of the sound box, air is forced through the supply pipe and U tube and into the tubular extensions of the sound box where it strikes against the conical spreader and is turned outwardly against the inner surface of the sound box passing around the periphery of the spreader, and then moving toward the center through the silk diaphragm into the valve chamber, from whence it passes with a uniform pressure into the valve. The movable member of the valve is vibrated or flexed by means of the stylus actuated by the record so as to vary the amount of opening through which the air is permitted to pass, this operation producing sound waves in the air as it issues from the valve and reproducing the waves impressed upon the record.

Current for operating the machine is 130



brought by means of a flexible conductor or cord 104 extending into the upper chamber of the casing to a fuse box 105 from whence it is led through suitable insulating  
 5 pipes to the starting switch 106 which is controlled by buttons 107 and 108 projecting through the side of the case, and thence downwardly through the partition 11 to the motor. Arranged upon one side of the cabi-  
 10 net is the crank 109, for winding the said spring motor 9 which actuates the turn table.

In the operation of this machine as a whole, the air is first drawn through the  
 15 filter 34, and then through the casing of the electric motor 13 where the air not only keeps the motor from overheating, as heretofore described, but is also incidentally slightly heated in return. This incidental  
 20 heating of the air as it passes through the motor increases the hygroscopic property of the air which may result in a tendency to keep the sound reproducing mechanism in the sound box dry and to produce other de-  
 25 sirable results.

From the interior of the motor the air is drawn through the orifice 30, duct 29 and inlet chamber 28 and into the blower 12 from which it is driven upwardly into the  
 30 separator 37 where it is freed from oil or similar matter taken up in its passage through the motor and blower and is also freed from water or vapor. From the separator the air passes through the pipes 52  
 35 into the pressure equalizer 48, and then passes through the pipes 51 and 55 into the second air filter 56 where the air is finally freed from any solid or liquid impurities that may have been carried through the  
 40 equalizer.

The air thus purified then passes through the pipe 59, through the flexible pipe 70, and into the supply tube 96 fixed on the sound box arm. From the supply tube 96  
 45 the air passes through the U tube 97, through the sound box 7 where sound waves are impressed upon the air as heretofore described. From the sound box the sound waves are delivered through the U tube 98,  
 50 and into the tapering sound box arm 6, and are then delivered from the machine through the sound amplifier 8.

There are many advantages due to the construction and arrangement of parts in  
 55 this machine and some of these have been mentioned hereinbefore. By having a filter over the air inlet of the motor the greater part of the dust and foreign matter in the air is separated, as heretofore described,  
 60 from the air before it enters the motor and the blower and this tends to insure the steady and smooth operation of these parts in particular and the machine as a whole.

By placing a separator between the blower  
 65 and the equalizer it is possible to keep the

motor and the blower sufficiently well lubricated to permit of their smooth and regular operation at the high speed necessary to insure the delivery of a substantially steady  
 70 pressure of air from the blower without the possibility of any of the oil being carried into the sound box.

The pressure equalizer takes up and substantially eliminates the slight fluctuations in the pressure of the air current as it is  
 75 delivered from the blower through the separator and also substantially eliminates the fluctuations in the pressure that without an equalizer might be caused by the uneven flow of the current through the sound box,  
 80 and makes it possible to deliver a smooth and substantially uniform pressure of air to the sound box during the reproduction of sound. The filter arranged between the pressure equalizer and the sound box guards  
 85 against the remote chance of any foreign matter being carried past the equalizer and into the sound box.

By this construction and arrangement the utmost protection is given to the sound box  
 90 against the introduction of any dust or oil or other foreign matter, the slightest amount of which might interfere seriously with the operation of the delicate sound reproducing mechanism in the box. This construction  
 95 also makes it possible to remove the foreign matter which collects in the separator, equalizer and filters or to repair or replace these parts without interfering with the adjustment of the sound reproducing mecha-  
 100 nism in the sound box. In addition to the advantages hereinbefore pointed out there are obviously other advantages which will be apparent to those skilled in the art.

Although only a single embodiment of this  
 105 invention has been described herein, it is obvious that various modifications might be made in the arrangement and construction of the various features of the device without departing from the spirit of this invention  
 110 or the scope of the appended claims.

Having thus fully described my invention what I claim and desire to protect by Letters Patent is:

1. In a talking machine, the combination  
 115 with a movable sound box provided with a valve port, and including a valve arranged to substantially close said port, and means to actuate said valve to impress sound waves upon a fluid current passing through said  
 120 port, of means for causing a fluid current to pass through said port, and means supported independently of said sound box, for removing foreign matter from said current before it passes into said sound box.  
 125

2. In a talking machine, the combination with a movable sound box provided with a valve port, and including a valve arranged to substantially close said port, and means to actuate said valve to impress sound waves  
 130



upon a fluid current passing through said port, of means for causing a fluid current to pass through said port, and a filter supported independently of said sound box, for removing foreign matter from said current before it passes through said sound box.

3. In a talking machine, the combination with a movable sound box provided with a valve port, and including a valve arranged to substantially close said port, and means to actuate said valve to impress sound waves upon a fluid current passing through said port, of means for causing a fluid current to pass through said port, and a separator supported independently of said sound box, for removing foreign matter from said current before it passes through said sound box.

4. In a talking machine, the combination with a movable sound box provided with a valve port, and including a valve arranged to substantially close said port, and means to actuate said valve to impress sound waves upon a fluid current passing through said port, of means for causing a fluid current to pass through said port, and a separator and a filter supported independently of said sound box, for removing foreign matter from said current before it passes through said sound box.

5. In a sound reproducing machine, the combination with a movable sound box, of a filter supported independently of said box and communicating therewith, and means for supplying air under pressure to said sound box through said filter.

6. In a sound reproducer, the combination with a movable sound box, of a pressure equalizer supported independently of said box and communicating therewith, and means for supplying air under pressure to said sound box through said equalizer.

7. In a sound reproducer, the combination with a movable sound box, of a separator supported independently of said box and communicating therewith, and means for supplying air under pressure to said box through said separator.

8. In a sound reproducer, the combination with a movable sound box, of a pressure equalizer, and a filter, both supported independently of said box, and means for supplying air under pressure to said box through said equalizer and said filter.

9. In a sound reproducer, the combination with a movable sound box, of a filter, a pressure equalizer, and a separator, all supported independently of said box and means for supplying air under pressure to said sound box through said filter, said equalizer and said separator.

10. In a sound reproducing machine the combination with a rotary record support of a sound box arranged to travel across said support, a stationary pressure equalizer

communicating with said sound box, and means communicating with said equalizer for supplying air under pressure to said sound box through said equalizer.

11. In a sound reproducer, the combination with a rotary record support of a sound box arranged to swing across the same, a stationary pressure equalizer, a stationary filter, and means for forcing a fluid current to said sound box through said equalizer and filter.

12. In a sound reproducer, the combination with a sound box, of means for purifying a fluid current, and means communicating with said sound box through said first mentioned means for supplying said sound box with a fluid current, said sound box being arranged to move with respect to said purifying means when said sound box is in operation.

13. In a sound reproducer, the combination with a swinging sound box arm, of a sound box carried thereby, a stationary filter and a blower communicating with said sound box through said filter for supplying said sound box with a fluid current.

14. In a sound reproducer, the combination with a movable sound box, of a stationary separator and means communicating with said sound box through said separator for supplying said sound box with a fluid current.

15. In a sound reproducer, the combination with a movable sound box, of a stationary filter, a stationary pressure equalizer, a stationary separator, and a blower communicating with said sound box through said filter, said equalizer and said separator, for supplying said sound box with a fluid current.

16. In a talking machine, the combination with a cabinet providing two compartments, a rotary record support carried by said cabinet and arranged outside of said compartments, movable sound reproducing means arranged to cooperate with a record on said support, actuating means for said support in one of said compartments, an air compressor in the other of said compartments, and means arranged to conduct air from said compressor to said sound reproducing means and including means supported independently of said sound reproducing means for removing impurities from said air.

17. In a talking machine, the combination with a cabinet providing two compartments, a rotary record support carried by said cabinet and arranged outside of said compartments, movable sound reproducing means arranged to cooperate with a record on said support, actuating means for said support in one of said compartments, an air compressor in the other of said compartments, and means arranged to conduct air

from said compressor to said sound reproducing means and including means supported independently of said sound reproducing means for removing impurities from  
5 said air; and means supported independently of said sound reproducing means for equalizing the pressure of said air.

In witness whereof I have hereunto set my hand this 9th day of March A. D. 1907.

WILBURN N. DENNISON.

Witnesses:

ALSTON B. MOULTON,  
ALEXANDER PARK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



PHONOGRAPH PATENT.

TALKING MACHINE,

# 1,150,347-----W. N. Dennison,  
Patented-August 17, 1915.  
Filed-March 28, 1912.

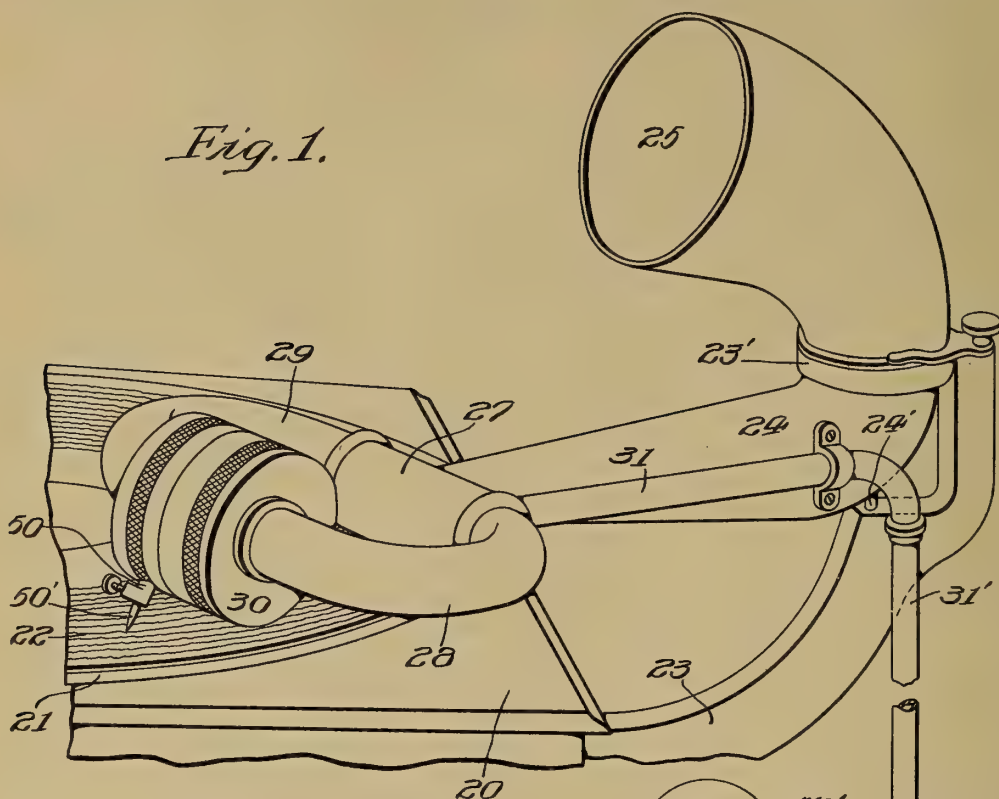
W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED MAR. 28, 1912.

1,150,347.

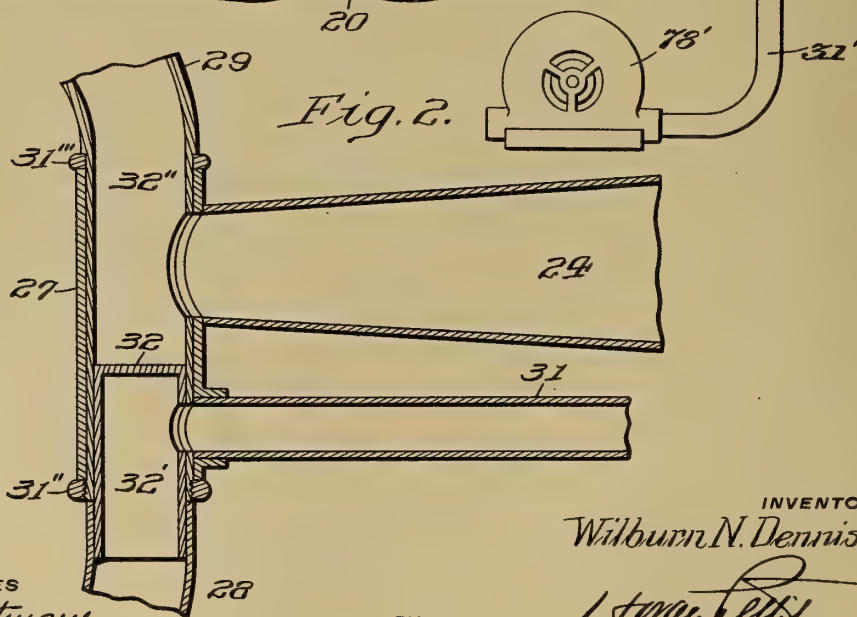
Patented Aug. 17, 1915.

3 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2.*



WITNESSES

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TALKING MACHINE.  
APPLICATION FILED MAR. 28, 1912.

1,150,347.

Patented Aug. 17, 1915.

3 SHEETS—SHEET 2.

Fig. 3.

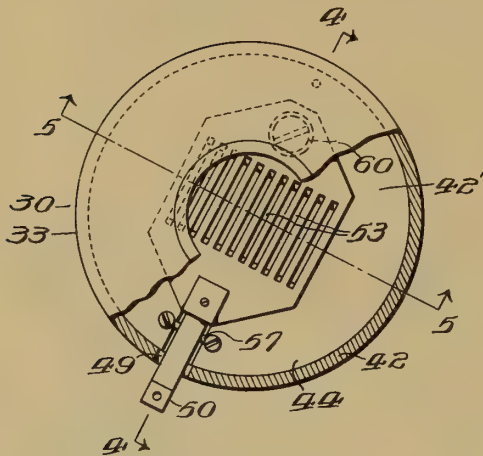


Fig. 7.

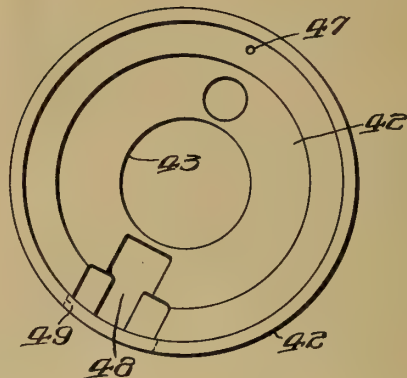


Fig. 4.

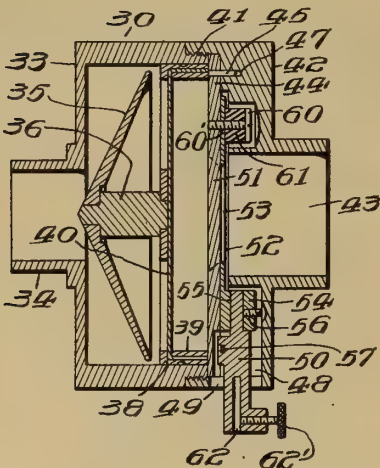
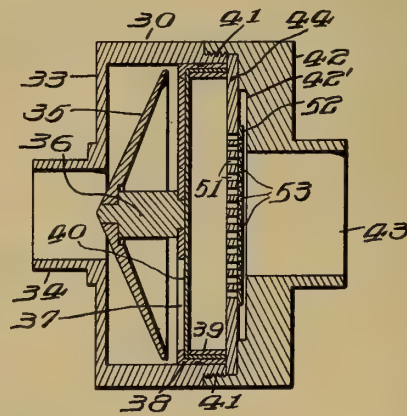


Fig. 5.



WITNESSES

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1/10/15

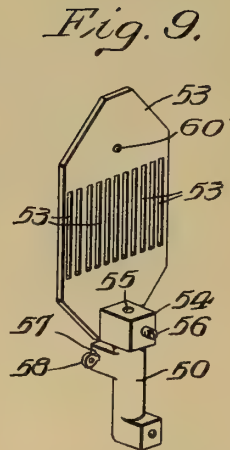
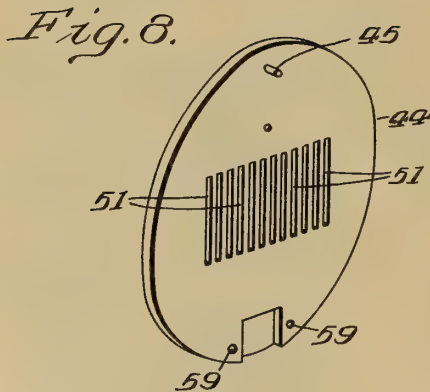
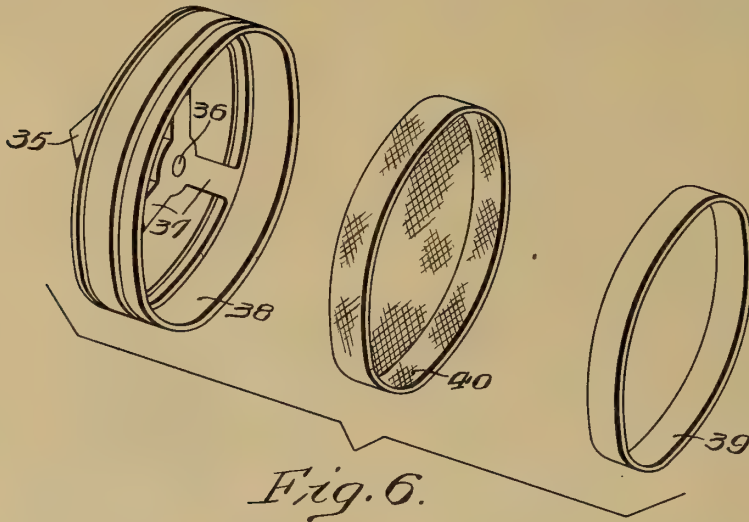
ATTORNEY



W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED MAR. 28, 1912.

1,150,347.

Patented Aug. 17, 1915.  
3 SHEETS—SHEET 3.



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## TALKING-MACHINE.

1,150,347.

Specification of Letters Patent. Patented Aug. 17, 1915.

Original application filed March 8, 1906, Serial No. 304,836. Divided and this application filed March 28, 1912. Serial No. 686,825.

*To all whom it may concern:*

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of Merchantville, New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification, this application being a division of application Serial No. 304,836, filed March 8, 1906.

This invention relates to talking machines of the type commonly known as pneumatic, and in which sound waves are impressed upon a fluid current by means coöperating with a sound record.

The main objects of this invention are, to provide an improved pneumatic talking machine, simple and durable in construction and highly efficient in operation; to provide in a pneumatic talking machine an improved sound box or sound reproducer, and an improved mounting therefor; to provide in a pneumatic sound box an improved valve and means for balancing the same; to provide in a pneumatic sound box means for delicately and accurately controlling the flow of a fluid current therethrough; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary perspective view of a talking machine constructed in accordance with this invention; Fig. 2 a fragmentary central sectional view of a portion of the same; Fig. 3 a fragmentary end view of an improved sound box forming part of this invention; Fig. 4 a sectional view taken on the line 4—4 of Fig. 3; Fig. 5 a sectional view taken on line 5—5 of Fig. 3; Fig. 6 a perspective view showing parts of the same separated from each other; Fig. 7 an end view of a detail of the sound box; and Figs. 8 and 9 are perspective views of details of the same.

Referring to the drawings, one embodiment of this invention comprises a cabinet 20, upon which is mounted the usual or any suitable turn-table 21, for carrying the usual or any suitable sound record 22, the turn-table being rotated by the usual driving mechanism (not shown), mounted in the cabinet 20.

Projecting rearwardly and upwardly from the cabinet 20 is a bracket 23, secured to the upper end of which and projecting inwardly therefrom is a horizontal ring or annular

support; 23'. Depending from the ring 23', 55 is the larger end of a tapering hollow sound box arm of tone arm 24, which is mounted to swing in a horizontal plane about a vertical pivot 24', carried by the outer portion of the bracket 23 and engaging the under portion of the larger end of the tone arm. Projecting upwardly from the ring 23', and carried thereby, is a sound amplifying horn 25, communicating with the tone arm 24. 60

For supporting a sound box in communication with the smaller free end of the tone arm 24, and for supplying the sound box with a fluid current, the smaller end of the tone arm terminates in a transverse tubular horizontal connection or support 27, rigidly secured thereto. The free end of the tone arm 24 is open and registers with an opening provided therefor through the wall of the transverse tubular support 27. Projecting laterally in opposite directions from the ends of the support 27, are two U-shaped oppositely disposed tubes, 28 and 29, the inner ends of which are coaxial with the tubular support 27, and the outer ends of which are coaxial with and firmly attached 80 to the opposite ends respectively of a sound box 30. One, 28, of these U-shaped tubes forms a supply tube for the sound box 30, and the other, 29, U-shaped tube forms a discharge pipe for the sound box. The U-shaped supply tube 28 communicates with a supply pipe 31, which extends rearwardly from the tubular support 27 substantially parallel to the sound box arm 24. The front end of the supply pipe 31 is open and is secured in an opening provided therefor in the wall of the tubular support 27, this end of the pipe 31 being flush with the inner surface of the support 27. The rear portion of the supply pipe 31 is rigidly secured to the larger end of the tone arm 24, curves downwardly, and terminates in communication with a piece of rubber or other flexible tubing 31', secured thereto and by which it is connected to a suitable fluid compressor or other source of fluid supply shown diagrammatically in reduced form at 28'. 85 90 95 100

For connecting the U-shaped tubes 28 and 29 rotatably to the tubular support 27, the inner portion of the U-shaped tube 29, forming the discharge passage between the sound box and the tone arm, is reduced in diameter and is extended entirely through 105



the tubular support 27, fitting snugly but rotatably therein, and held against longitudinal movement therein by means of a collar 31'', threaded over the projecting end of the U-shaped tube 29 and abutting against the adjacent end of the tubular support 27, and a collar 31''' surrounding the reduced portion of the U-shaped tube 29 and engaging upon its outer side against the shoulder between the reduced inner portion of the U-shaped tube 29 and its main portion, and upon its inner side against the adjacent end of the tubular support 27.

The inner end of the U-shaped tube 28 abuts against the inner end of the U-shaped discharge tube 29, and is rigidly connected thereto by means of a short tube, one end, 32, of which is closed and fits snugly within the end of the U-shaped discharge tube 29, and the other end of which is open and fits snugly in the inner end of the U-shaped supply tube 28. The closed end 32 of this short tube is arranged between the free end of the tone arm 24 and the adjacent end of the supply pipe 31, dividing the interior of the tubular support 27 into two chambers, 32' and 32'', one, 32', of which communicates with the adjacent end of the supply pipe 31 through a substantially circular opening through the cylindrical walls of the short tube 32 and containing tube 29, which registers with a corresponding opening leading through the tubular support 27, when the sound box is in operative position. The other, 32'', of these chambers communicates with the open free end of the tone arm 24 through a substantially circular opening provided through the cylindrical wall of the U-shaped tube 29, which registers with the opening in the end of the tone arm 24 when the sound box is in operative position. By this construction the sound box 30 is free to oscillate in a vertical plane about the longitudinal axis of the tubular support 27, and also may swing laterally across the record about the vertical pivot 24' of the tone arm 24.

One form of pneumatic sound box constructed in accordance with this invention comprises (see Figs. 3 to 9) a cylindrical casing 33, open at its inner end and closed at its outer end, and provided at its closed end with a projecting tubular portion 34, coaxial therewith and telescoping tightly within the outer end of the U-shaped supply tube 28 and forming an inlet for the sound box when the sound box is in operation.

For spreading and distributing the fluid current in the sound box, there is arranged within the casing 33, and coaxial therewith, a conical deflector 35, the apex of which faces toward the inlet of the sound box formed by the tubular projection 34. This conical deflector is slightly less in diameter than the internal diameter of the casing 33,

and is mounted upon a stud 36, coaxial therewith and projecting inwardly therefrom, and the inner end of which is supported by a spider comprising arms 37, projecting radially from the stud 36, and the outer ends of which are integral with or secured to a cylindrical ring 38, which fits snugly within the interior of the casing 33.

For filtering the fluid current as it passes through the sound box, and for equalizing its pressure, there is provided a foraminated diaphragm 40, preferably consisting of a piece of closely woven silk fabric, the margin of which is clamped between the inner cylindrical surface of the ring 38, supporting the deflector 35, and the outer cylindrical surface of a second cylindrical ring 39, telescoping therein, the rear edges of the two rings being preferably flush.

The open end of the casing 33 is reduced externally in diameter and the reduced portion is provided with screw threads 41, which engage corresponding internal threads of a cap or cover 42. The cap or cover is provided with a cylindrical tubular extension 43, projecting outwardly therefrom, coaxial therewith, and of less diameter than the cap, and which telescopes tightly within the U-shaped discharge tube 29, forming an outlet for the sound box.

For impressing sound waves on a fluid current passing through the sound box, there is provided a flat circular valve seat 44, which is arranged coaxially with and in a plane perpendicular to the longitudinal axis of the sound box, and between the diaphragm 40 and the inner surface of the cover 42.

The marginal portion of the valve seat 44 is clamped in an annular internal groove provided therefor between the sound box casing 33 and its cover 42. The valve seat is held in a predetermined position with respect to the cover by means of a positioning pin 45, projecting through and rigidly secured to the valve seat and engaging in an opening 47 in the inner side of the cover, and the valve seat is thus prevented from rotating with respect to the cover as the cover is being rotated into position upon, or is being removed from, the casing 33.

The valve seat 44 is provided centrally with one or more openings or ports. When a plurality of ports are used, they may be in the form of a series of parallel narrow slits or openings 51, which preferably extend over an area somewhat greater than the transverse sectional area of the opening through the tubular extension 43 forming the outlet of the sound box, for a purpose hereinafter explained.

Coöperating with the valve seat 44, and between the valve seat and the adjacent inner surface of the cover 42 of the sound box casing, is a valve 52, which is actuated



by a stylus bar 50, actuated by a stylus 50', which engages in the usual socket 62 of the stylus bar and which is held in place therein, as usual, by a set-screw 62', and which  
 5 coöperates with a sound record 22, as described hereinafter.

The valve 52 is preferably in the form of a thin, flat plate or sheet of metal, preferably flexible, in which is arranged a series of  
 10 slits or openings 53, similar to the openings 51 in the valve seat 44, and so arranged that when the valve is in operative position on its seat 44 the bridges between the openings of the one register with and normally cover  
 15 the openings of the other. To provide a suitable space to receive the valve and the stylus bar, the inner surface of the cover 42 is provided with a shallow recess or depressed portion 42', adapted to receive the  
 20 valve, and in which is located a recess 48 extending radially with respect to the cover and adapted to receive the inner end of the stylus bar 50 and communicating with a radially extending opening 49 through the  
 25 cylindrical wall of the cover, and through which the stylus bar projects outwardly from the sound box casing.

For securing the stylus bar 50 to the valve 52, the valve is preferably provided with a  
 30 lug 54, brazed or otherwise secured thereby, and provided with an aperture 55, within which the inner end of the stylus bar 50 is snugly fitted and also secured by a set-screw 56 extending through the lug and engaging  
 35 the stylus bar.

The stylus bar 50 is mounted to oscillate upon a tension spring 57, which passes transversely through the stylus bar and which is provided at its opposite ends with ears 58,  
 40 which are secured to the valve seat 44 by means of screws threaded as at 59 into the valve seat, thus securing the spring 57 to the valve seat.

To prevent displacement of the valve in its own plane, there is attached to the valve  
 45 seat a screw 60, which passes through an opening 60' provided therefor in the valve, and to hold the valve yieldingly against its seat the screw 60 may be provided with a  
 50 head and a spring or rubber washer 61 may be interposed between the head of the screw and the outer surface of the valve. When the stylus bar is oscillated by coöperation with the sound record, the valve will be  
 55 flexed between the tension spring 57, upon which it is mounted, and the outer end of the valve, the flexed portion being slightly lifted from its seat and permitting the fluid current to pass through the valve. The  
 60 screw 60 and washer 61 may, however, be dispensed with and the valve be permitted to vibrate freely upon the tension spring 57.

In the above described construction the inner surface of the cover 42 is spaced from  
 65 the opposite outer surface of the valve 52

only a sufficient distance to permit of the free oscillation of the valve, and to provide a narrow passage for the fluid current between the valve and the wall of the cover. In practice the distance between the valve  
 70 and the adjacent wall of the cover, when the valve is in contact with its seat, is preferably only about 3/1000 of an inch. The object of this construction is to trap air passing between the valve and the cover to  
 75 form a cushion for the valve.

In the operation of this invention, air or any other suitable fluid is conducted through the flexible tube 31', supply pipe 31, chamber 32' and curved supply tube 28  
 80 into the interior of the sound box casing, 33, where the air impinges against the convex surface of the conical deflector 35, by which it is spread and directed toward the cylindrical wall of the sound box casing. The  
 85 air then passes between the cylindrical wall of the sound box casing and the outer edge of the deflector 35 and is delivered radially inwardly against the diaphragm or screen 40, striking the outer portions of the screen  
 90 first. The air then passes through the screen 40 into the openings or ports 51 in the valve seat 44. The deflector 35 therefore acts in coöperation with the screen 40 to insure a uniform distribution of the air  
 95 through the ports of the valve seat. If some such provision were not made for spreading or distributing the air in the sound box, the air would impinge directly upon the inner side of the valve seat and  
 100 would pass through the various openings in the valve seat and valve at various speeds, more air passing through the middle of the valve than through the outer portions thereof. After passing through the valve seat,  
 105 some of the air then passes through the corresponding openings 53 of the valve; the remaining portion of the air, however, passing through the space between the valve seat and the valve as the valve is oscillated and  
 110 flexed, and around the margin of the valve and between the valve and the inner surface of the cover 42.

The portion of the air which passes through the central portion of the valve will  
 115 continue directly out through the tubular outlet 43 of the sound box, and the portions of the air which pass around the valve or through the outer openings of the valve will  
 120 first be deflected by the inner surface of the cover 42 to cushion the valve, and will then pass out through the tubular outlet 43 of the sound box, mingling with the air that has  
 125 passed through the central portion of the valve. From the tubular outlet 43 of the sound box, the air passes through the U-shaped discharge tube 29 and through the circular opening in the inner portion of the tube and into the tone arm 24, from whence  
 130 it is delivered from the device through the



amplifier 25. It is therefore evident that the amount of air which is permitted to pass through the sound box will be constantly varied by the oscillations of the valve, actuated when in operation by the stylus bar and stylus, oscillated by and in accordance with a sound record, and consequently that vibrations corresponding to the sound waves recorded on the record will be set up in the air passing through the sound box by this oscillation of the valve. It is also evident that the sound box may be inverted from an operative position with its stylus in contact with a record, into an inoperative position where it will rest upon the free end of the tone arm 24, and that by thus inverting the sound box, the opening in the free end of the tone arm 24 and the opening in the corresponding adjacent end of the supply pipe will be closed and the flow of current through the sound box will be stopped. This inversion of the sound box therefore effects the double function of moving the sound box into an inoperative position, and of stopping the flow of the fluid current therethrough, or, in other words, when the sound box is inverted into an inoperative position, the flow of the fluid current through the sound box is automatically stopped and a waste of power is prevented.

This invention is not limited in its application to the particular construction hereinbefore described, but may be applied in other forms to meet various conditions, without departing from the spirit of this invention or the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. The combination with a sound box provided with means for conveying a fluid current therethrough, of means whereby said current is stopped by raising the sound box from its operative position.

2. The combination with a sound box, provided with an orifice, of means for conveying a fluid current through the said orifice and means whereby the flow of current is stopped when the sound box is moved out of its operative position, said latter means comprising a valve connected to the sound box.

3. The combination with a sound box provided with a passage therethrough, of means arranged to convey a fluid current through said sound box, said means comprising an inner and an outer tube, said tubes being provided with openings which register with each other when the sound box is in its operative position and which are closed when the sound box is lifted out of its operative position.

4. The combination with a sound box, provided with an inlet and an outlet orifice, of U tubes secured to said sound box over

said inlet and outlet orifices, and a sleeve pivotally connected to the outer ends of said U tubes, said sleeve being provided with inlet and outlet orifices and one of the said U tubes having orifices which register with the orifices of said sleeve when the sound box is in its operative position.

5. The combination with a sound box, provided with an inlet and an outlet orifice of two tubes secured to said sound box over said orifices respectively, a supply pipe pivotally connected to one of said tubes and a sound amplifier pivotally connected to the other of said tubes.

6. In a talking machine, the combination with a sound box provided with a passage therethrough, of a U-shaped tube engaging at one end one side of said box and communicating with said passage, a source of fluid supply communicating with said U-shaped tube, a U-shaped tube engaging at one end the other side of said box and communicating with said passage, and a movable sound box arm connected to said tubes.

7. In a talking machine, the combination with a sound box provided with an inlet orifice and an outlet orifice, of a U-shaped tube secured to said sound box over each of said orifices, and a sleeve pivotally connected to the outer ends of said U-shaped tubes, said sleeve being provided with an inlet orifice and an outlet orifice, and one of the said U-shaped tubes having an orifice which registers with an orifice of said sleeve when the sound box is in its operative position, and which is closed when the sound box is moved to rotate the said U-shaped tubes with respect to said sleeve.

8. In a talking machine, the combination with a hollow sound box arm, of a transverse tubular support secured to one end of said arm, a discharge tube mounted in and rotatable with respect to said support and communicating with said arm, a supply pipe connected to said transverse tube, a supply tube rotatable coaxially with said discharge tube and communicating through said transverse tube with said supply pipe, and a pneumatic sound reproducer carried by and forming a means of communication between said discharge tube and said supply tube.

9. In a talking machine, the combination with a fixed support, of an arm mounted to swing with respect thereto, a sound box carried by and movable with respect to said arm, and means mounted to swing on an axis coincident with the axis of said arm, for supplying said sound box with a fluid current.

10. In a talking machine, the combination with a hollow movable sound box arm of a sound box supported thereby and movable with respect thereto and provided with means for impressing sound waves upon a fluid current, a tubular conveyer for supply-



ing a fluid current to said sound box, a curved tubular connection through which said conveyer communicates with said sound box, and a curved tubular connection between said sound box and said sound box arm through which said sound box communicates with said sound box arm, said curved tubular connections being movable with respect to said sound box arm.

11. In a talking machine, the combination with a sound box, of a pair of rotatively mounted U-shaped tubes engaging opposite sides respectively of said sound box, and means for supplying one of said tubes with a fluid current, the other of said tubes acting as an outlet for said box.

12. In a pneumatic talking machine, the combination with a fixed support, of a sound conducting arm mounted thereon to swing on a fixed axis, a sound box carried by said arm and movable with respect thereto and having an outlet communicating therewith, and means mounted to swing coaxially with said arm for supplying said sound box with a fluid current.

13. In a talking machine, the combination with a swinging arm, of a sound box carried thereby and movable with respect thereto, an air supply tube in communication with said sound box and secured to said arm, means for supplying air to said air supply tube, and a flexible tube connecting said means to said air supply tube.

14. In a sound reproducer, the combination with a sound box having an aperture therein, of U-shaped tubular extensions at each end of said sound box, a sleeve pivotally connecting the two ends of said U extensions, said sleeve being divided into two compartments, a fluid supply pipe opening into one of said compartments, sound amplifying means communicating with the other of said compartments, means for impelling a current of air through said supply pipe, and means for impressing sound waves upon said current as it passes through said sound box.

15. In a talking machine, the combination with a sound box provided with a passage therethrough, of a U-shaped tube engaging at one end one side of said box, and communicating with said passage, a source of fluid supply communicating with said U-shaped tube, a U-shaped tube engaging at one end the other side of said box and communicating with said passage forming an outlet therefor, the other ends of said U-shaped tubes being in axial alinement, and sound conducting means by which said other ends are supported and with respect to which said other ends are rotatable.

16. In a talking machine, the combination with a pneumatic sound box, of a pair of tubes engaging opposite sides respectively of said sound box, said tubes being mounted

to oscillate about an axis parallel to the longitudinal axis of said sound box, and means for supplying one of said tubes with a fluid current.

17. In a talking machine, the combination with a sound box arm, of a sound box, means connecting said arm and said sound box and forming an inlet and an outlet for said sound box and engaging axially opposite sides of the same, said means being movable with respect to said arm to permit said sound box to move with respect to said arm, and means for forcing a fluid current into said sound box through said inlet.

18. In a talking machine, the combination with a hollow sound box arm, of a sound box supported thereby and provided with means for impressing sound undulations upon a fluid current, a tubular conveyer for a fluid current carried by said arm, a curved tubular connection between said conveyer and said sound box, and a curved tubular connection between said sound box and said arm through which sound waves are conducted from said box to said arm, said curved tubular connections being movable with respect to said arm to permit said box to swing with respect to said arm.

19. In a talking machine, the combination with a hollow sound box arm, of a pneumatic sound box, a tubular connection between said sound box and said arm through which said box communicates with the arm, a tubular conveyer for a fluid current carried by said arm, and a tubular connection between said conveyer and said sound box and forming an inlet for said sound box, said connections being movable with respect to said arm to permit said sound box to swing with respect to said arm.

20. In a talking machine, the combination with a rotary record support, of a hollow sound box arm mounted to swing in a fixed plane across said support, a fluid pressure pipe connected to said arm and carried thereby, means for supplying said pipe with fluid under pressure, and a pneumatic sound box connected to said arm and movable with respect thereto toward and away from said record support, said sound box having an inlet communicating with said pipe and an outlet communicating with said arm.

21. In a talking machine, the combination with a rotary disk record support, of a sound box arm mounted to swing in a fixed plane across said support, a pneumatic sound box connected to said arm and movable with respect thereto toward and away from said support, and means for supplying said sound box with a fluid current.

22. In a talking machine, the combination with a rotary disk record support, of a sound box arm mounted to swing in a fixed plane across said support, a pneumatic sound box connected to said arm and mov-



able with respect thereto toward and away from said support, and means carried by said arm for supplying said sound box with a fluid current.

23. In a talking machine, the combination with a rotary record support, of a sound box arm mounted to move across said support, a pneumatic sound box connected to said arm and movable with respect thereto toward and away from said support, and means for supplying said sound box with a fluid current.

24. In a talking machine, the combination with a rotary record support, of a sound box arm mounted to move across said support, a pneumatic sound box connected to said arm and movable with respect thereto toward and away from said support, and means carried by said arm for supplying said sound box with a fluid current.

25. In a talking machine, the combination with a rotary record support, of means mounted to move across said support, a pneumatic sound box connected to said means and movable with respect thereto toward and away from said support, and means for supplying said sound box with a fluid current.

26. In a talking machine, the combination with a rotary record support, of means mounted to move across said support, a pneumatic sound box connected to and carried by said means, and movable with respect thereto, into and out of operative position with respect to a record on said support, and means for supplying said sound box with a fluid current.

27. In a talking machine, the combination with a rotary record support, of means relatively movable with respect to said support, a pneumatic sound box connected to and carried by said means and movable with respect thereto, and means for supplying said sound box with a fluid current.

28. In a talking machine, the combination with a rotary record support, of means relatively movable with respect to said support, a pneumatic sound box connected to and carried by said means, and movable with respect thereto, into and out of operative position with respect to a sound record on said support, and means carried by said first mentioned means for supplying said sound box with a fluid current.

29. In a talking machine, the combination with a rotary record support, of a tubular sound box arm mounted to move across said support, a pneumatic sound box carried by and communicating with said arm and movable with respect thereto toward and away from said support, and means for supplying said sound box with a fluid current.

30. In a talking machine, the combination with a rotary record support, of a tubular sound box arm pivoted to swing across said

support, a pneumatic sound box carried by and communicating with said arm and movable with respect thereto toward and away from said support, and means for supplying said sound box with a fluid current.

31. The combination with a pneumatic sound box provided with an inlet and an outlet, of two tubes secured to said sound box and communicating with said inlet and said outlet respectively, a hollow sound conveyer forming an outlet for one of said tubes, and a tubular fluid conveyer arranged to deliver a fluid current to the other of said tubes, one of said conveyers being movable, and said tubes and said sound box being arranged to swing with respect to said movable conveyer about a common axis.

32. The combination with a pneumatic sound box provided with an inlet and an outlet, of two tubes secured to said sound box over said inlet and said outlet respectively, a hollow sound conveyer forming an outlet for one of said tubes, and a tubular fluid conveyer for supplying the other of said tubes with a fluid current, said tubes being movably connected to said conveyers to swing in unison with said sound box and with respect to said conveyers about a common axis, and said conveyers being mounted to swing about a second common axis.

33. In a talking machine, the combination with a pneumatic sound box, of a pair of tubes engaging opposite sides respectively of said sound box and forming an inlet and an outlet therefor respectively, means for supplying one of said tubes with a fluid current, and a movable sound box arm to which said tubes are movably connected.

34. In a talking machine, the combination with a movable sound box arm, of a pneumatic sound box, means connecting said arm and said sound box and forming an inlet and an outlet for said sound box, said means being movable with respect to said arm, and means for supplying a fluid current to said sound box through said inlet.

35. In a talking machine, the combination with a record support, of a movable member, a pneumatic sound box carried by said movable member and movable with respect to said member toward and away from said record support and into an inoperative position, and means to supply said sound box with a fluid current, said sound box being supported when in said inoperative position by said member.

36. In a talking machine, the combination with a record support, of a movable member, a pneumatic sound box carried by said movable member and invertible with respect to said movable member from an operative into an inoperative position, and means carried by said movable member for supplying a fluid current to said sound box, said sound



box being entirely supported when in said inverted position by said movable member.

37. In a talking machine, the combination with a sound box provided with a passage therethrough, of a U-shaped tube engaging at one end one side of said box and communicating with said passage, a source of fluid supply communicating with said U-shaped tube, a U-shaped tube engaging at one end the other side of said box and communicating with said passage, and a movable sound box arm connected to the other ends of said tubes, said sound box and said tubes being movable in unison with respect to said arm.

38. In a talking machine, the combination of a sound box, a record support, means for conveying a fluid current through said sound box, said sound box and record support being relatively movable, and means controlled by a relative movement of said sound box and said record support for varying the flow of fluid current.

39. In a talking machine, the combination with a record support and a sound box movable with respect to said record support, of means for conveying a fluid current through the said sound box, and means actuated by said relative movement of the sound box with respect to the said record support for varying the flow of said fluid current.

40. In a talking machine, the combination with a record support, a sound box movable with respect to said record support to an inoperative position, means for conveying a fluid current through said sound box, and means controlled by the movement of said sound box to an inoperative position for stopping the fluid current.

41. In a talking machine, the combination of a sound box having a passage therethrough for a fluid current, a movable arm, a support therefor, and articulative means connecting said sound box and said arm and including fluid supply and discharge tubes communicating with the opposite ends of the said passage.

42. In a talking machine, the combination of a movable arm, a support therefor, a sound box having a passage therethrough for a fluid current, and means for permitting said sound box to move relatively to said arm, to assume operative and inoperative positions, said means communicating with the ends of said passage, respectively, and providing an inlet and an outlet for said fluid current.

43. In a talking machine, the combination of a sound box having a passage there- 60 through, a movable sound box arm, a support therefor, and means for conveying a fluid current through said sound box, said means communicating with opposite ends of said passage and being pivoted to said arm. 65

44. In a talking machine, the combination of a sound box having a passage there- through, a movable sound box arm, a sup- port therefor, and means for conveying a fluid current through said sound box, said 70 means including separate tubes communi- cating with opposite ends of said passage and pivoted coaxially to said arm.

45. In a pneumatic talking machine, the combination with a sound box, of means for 75 supplying a fluid current thereto, said sound box being movable into and out of operative position, and said means being rendered inoperative by moving said sound box from its operative position. 80

46. In a sound reproducer, the combina- tion of a sound box provided with an open- ing therethrough, U-shaped extensions at the ends of said sound box, a sleeve pivot- ally connecting the outer ends of said U 85 tubes, a partition dividing said sleeve into two compartments, a hollow taper arm ex- tending from one of said compartments, sound amplifying means communicating with said taper arm, a supply pipe com- 90 municating with the other of said compart- ments, a flexible tube communicating with said supply pipe, means for supplying a fluid current to said tube, and a valve over the opening of said sound box for im- 95 pressing sound waves upon the fluid current.

47. In a pneumatic talking machine, the combination with a sound box, of an air supply tube, and means actuated by mov- ing said sound box for closing said air sup- 100 ply tube.

48. In a talking machine, the combina- tion with a sound box provided with a passage therethrough, of a U-shaped tube engaging at one end one side of said sound 105 box and communicating with said passage, a U-shaped tube engaging at one end the other side of said sound box and communi- cating with said passage, and a movable sound box arm connected to said tubes. 110

In witness whereof, I have hereunto set my hand this 22nd day of March, 1912.

WILBURN N. DENNISON.

Witnesses:

JOHN D. MYERS,

DEAN S. RENWICK.



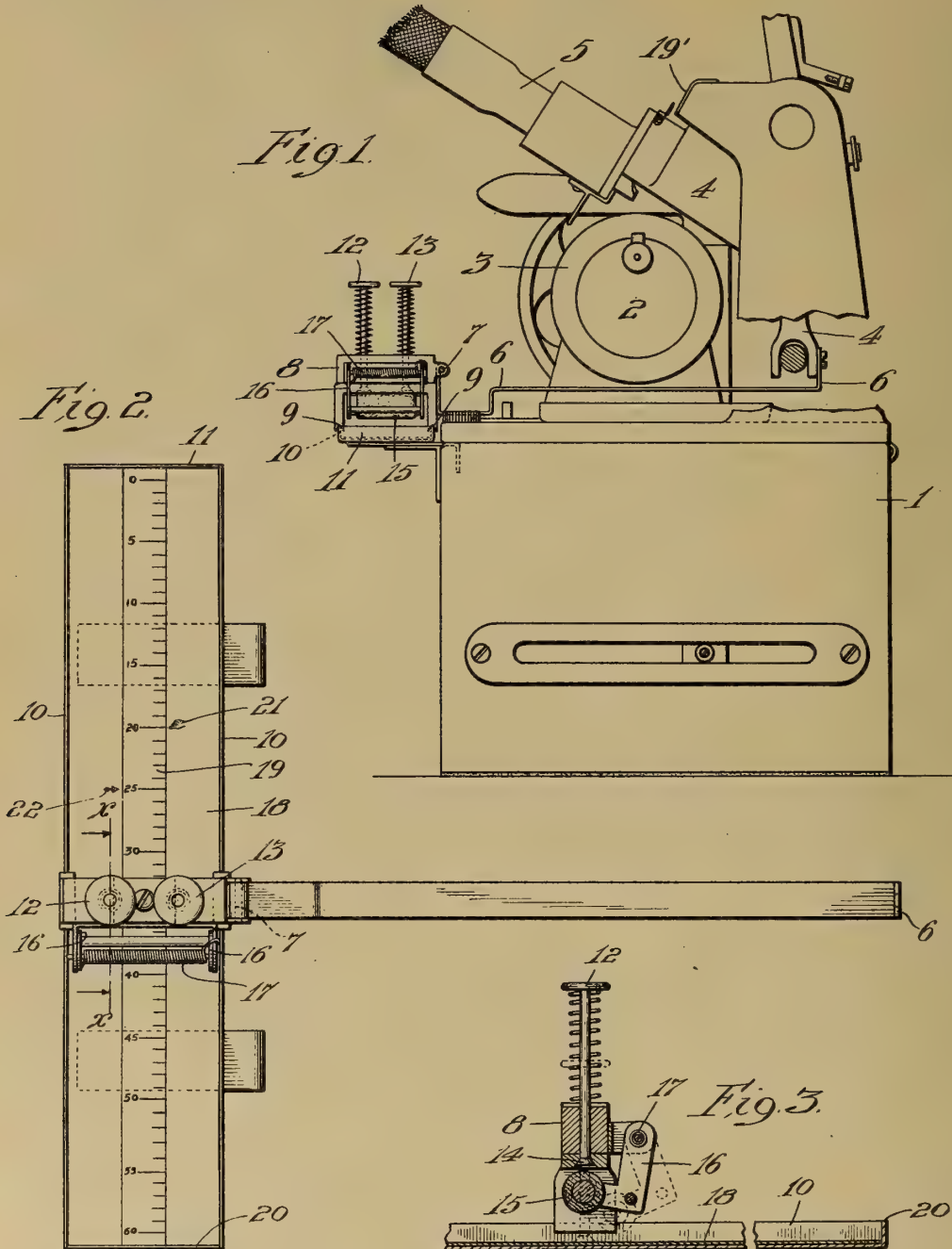
SOUND REPRODUCING INSTRUMENT,  
#1,150,563-----A. B. Walker,  
Patented-August 17, 1915.  
Filed-January 5, 1914.



A. B. WALKER.  
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# UNITED STATES PATENT OFFICE.

ARCHIE B. WALKER, OF CHICAGO, ILLINOIS.

## SOUND-REPRODUCING INSTRUMENT.

1,150,563.

Specification of Letters Patent. Patented Aug. 17, 1915.

Application filed January 5, 1914. Serial No. 810,475.

*To all whom it may concern:*

Be it known that I, ARCHIE B. WALKER, a citizen of the United States, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Instruments, of which the following is a specification.

My invention relates to improvements in sound reproducing instruments and more especially to sound reproducing instruments employed as a means for reproducing dictation by stenographers or typewriters, the object of the invention being to facilitate the reproduction of such dictation.

The invention consists in the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawing forming a part of this specification, and in which—

Figure 1 is an end view of a sound reproducing instrument with portions broken away and others in section, Fig. 2, a top plan view of a marking attachment attached to said instrument, and Fig. 3, a partial section taken on line  $x-x$  of Fig. 2.

The attachment is shown as used in conjunction with an ordinary sound reproducing instrument now on the market and known as the "dictaphone." This instrument comprises a suitable base or box 1 containing the operating mechanism of the instrument; a mandrel 2; a record cylinder 3 on said mandrel; a traveling carriage 4 and a speaking tube 5, all arranged to operate in the usual manner, the carriage 4 being provided with the usual means for recording sound on cylinder 3 or for audibly reproducing said sound as is usual in such machines.

As stated above the sound reproducing instrument is old and well known, constitutes no part of my present invention, except in so far as it enters into the combination and needs no further description here.

The preferred form of attachment illustrated in the accompanying drawing constitutes a supporting bracket or arm 6 secured to the lower rear portion of carriage 4 and

projecting forwardly under cylinder 3 to the forward edge of base 1, where it is turned upwardly and provided with a pivot 7, pivotally mounting a substantially U-shaped plunger frame 8 thereon. The lower edges of frame 8 are provided with grooves 9 running on the upturned edges 10 of a channel member 11 mounted at the upper forward edge of base 1. Two depressible spring held marking plungers 12 and 13 are mounted to slide vertically in frame 8 so as to permit the lower ends of said plungers to contact with the bottom of channel member 11. Each of the plungers 12 and 13 is provided at its lower end with a marking head 14, said marking heads being provided with distinctive marking means, in the present instance, plunger 12 being provided with means for printing an arrow and plunger 13 for printing a pointing finger. An inking roller 15 is mounted in angular swinging arms 16 pivoted to frame 8 and is normally held in operative relation with the marking heads 14 by means of a spring 17, the arrangement being such that when either of the plungers 12 or 13 is depressed the corresponding marking head 14 will be supplied with ink and at the same time roller 15 will be automatically swung out of the path of said plunger to permit of free depression thereof as indicated by dotted lines in Fig. 3. A removable strip of paper 18 is placed in the bottom of channel member 11 and is provided with a centrally arranged scale 19, the scale 19 being arranged to represent the length of travel of carriage 4 and consequently corresponding with the usual indicator scale 19' provided on the instrument, and being positioned between the paths of travel of plungers 12 and 13. A stop flange 20 is arranged at one end of channel member 11 and serves as a means for accurately positioning scale 19 with its zero in registration with the starting point of carriage 4 and its highest graduation in registration with the end of said travel.

In use the instrument is prepared for dictation in the usual manner and a paper strip 18 bearing the scale 19 is positioned in channel 11. The dictation is then commenced and continued in the usual manner. When



an error is made in the dictation or other occasion arises for caution to the typist who is to reproduce the same, the travel of carriage 4 is momentarily stopped and plunger 13 depressed to print a pointing finger 21 on strip 18 adjacent scale 19. At the termination of the dictation the carriage is again stopped and plunger 12 is depressed to print an arrow 22 on the other side of scale 19 to indicate the termination of the dictation. Thus the scale marked as shown in Fig. 2 would indicate that an error had been made at point 20 and that the dictation had ended at point 25 of scale 19. Further dictation may be continued until the corresponding record cylinder is entirely used up and similar indicating marks made on strip 18. If the same instrument is used in reproducing the dictation a visual record is presented to the operator indicating the places on the ordinary indicator scale of the instrument where caution must be exercised thus avoiding the repetition of the mistakes in dictation. If a different instrument is to be used in reproducing the dictation, the strip 18 is removed with the cylinder 3 and serves to notify the operator as to the places in the dictation where caution must be exercised.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. The combination with the traveling carriage of a sound reproducing instrument, of a support secured thereto; two depressible marking plungers on said support; and a scale arranged between the lines of travel of said plungers, substantially as described.

2. The combination with the traveling carriage of a sound reproducing instrument, of a support secured thereto; two depressible marking plungers on said support; and a paper scale removably arranged between the lines of travel of said plungers, substantially as described.

3. In combination a sound reproducing instrument traveling carriage; a supporting bracket secured to said carriage; a plunger frame pivotally connected with said bracket; a channel support for said plunger frame, there being notches in the lower portion of said frame riding on the edges of said channel; two depressible spring held marking plungers mounted in

said frame and adapted to contact with the bottom of said channel; distinctive marking elements on the bottoms of said plungers; a spring held inking roller normally contacting with said marking elements but arranged to be automatically swung from the path of said plungers upon depression thereof; and a strip of paper arranged in said supporting channel and provided with a centrally positioned scale arranged between the paths of travel of said plungers, substantially as described.

4. In combination a sound reproducing traveling carriage; a supporting bracket secured to said carriage; a marking frame pivotally connected with said bracket; a support upon which said frame rides; a marking element on said frame; and a mark receiving element on said support in operative relation with said marking element, substantially as described.

5. In combination a sound reproducing traveling carriage; a supporting bracket secured to said carriage; a marking frame pivotally connected with said bracket; a spring held depressible plunger on said frame; a marking element on the bottom of said plunger; a spring held inking roller normally contacting with said marking element but arranged to be automatically swung from the path of said plunger upon depression thereof; and a mark receiving element in operative relation with said marking element, substantially as described.

6. In combination a sound reproducing traveling carriage; a supporting bracket secured to said carriage; a marking frame pivotally connected with said bracket; a support upon which said frame rides; a spring held depressible plunger on said frame; a marking element on the bottom of said plunger; a spring held inking roller normally contacting with said marking element but arranged to be automatically swung from the path of said plunger upon depression thereof; and a mark receiving element in operative relation with said marking element, substantially as described.

7. In combination a sound reproducing traveling carriage; a supporting bracket secured to said carriage; a spring held depressible plunger on said bracket; a marking element on the bottom of said plunger; a spring held inking roller normally contacting with said marking element but arranged to be automatically swung from the path of said plunger upon depression thereof; and a mark receiving element in operative relation with said marking element, substantially as described.

8. In combination a sound reproducing traveling carriage; a supporting bracket secured to said carriage; a marking frame pivotally connecting with said bracket; a



channel support upon which said frame  
rides, there being notches in the lower por-  
tion of said frame engaging the edges of  
said channel; a marking element on said  
5 frame; and a mark receiving element on  
said support in operative relation with said  
marking element, substantially as described.

In testimony whereof I have signed my  
name to this specification in the presence of  
two subscribing witnesses.

ARCHIE B. WALKER.

Witnesses:

JOSHUA R. H. POTTS,

HELEN F. LILLIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."



SOUND BOX,

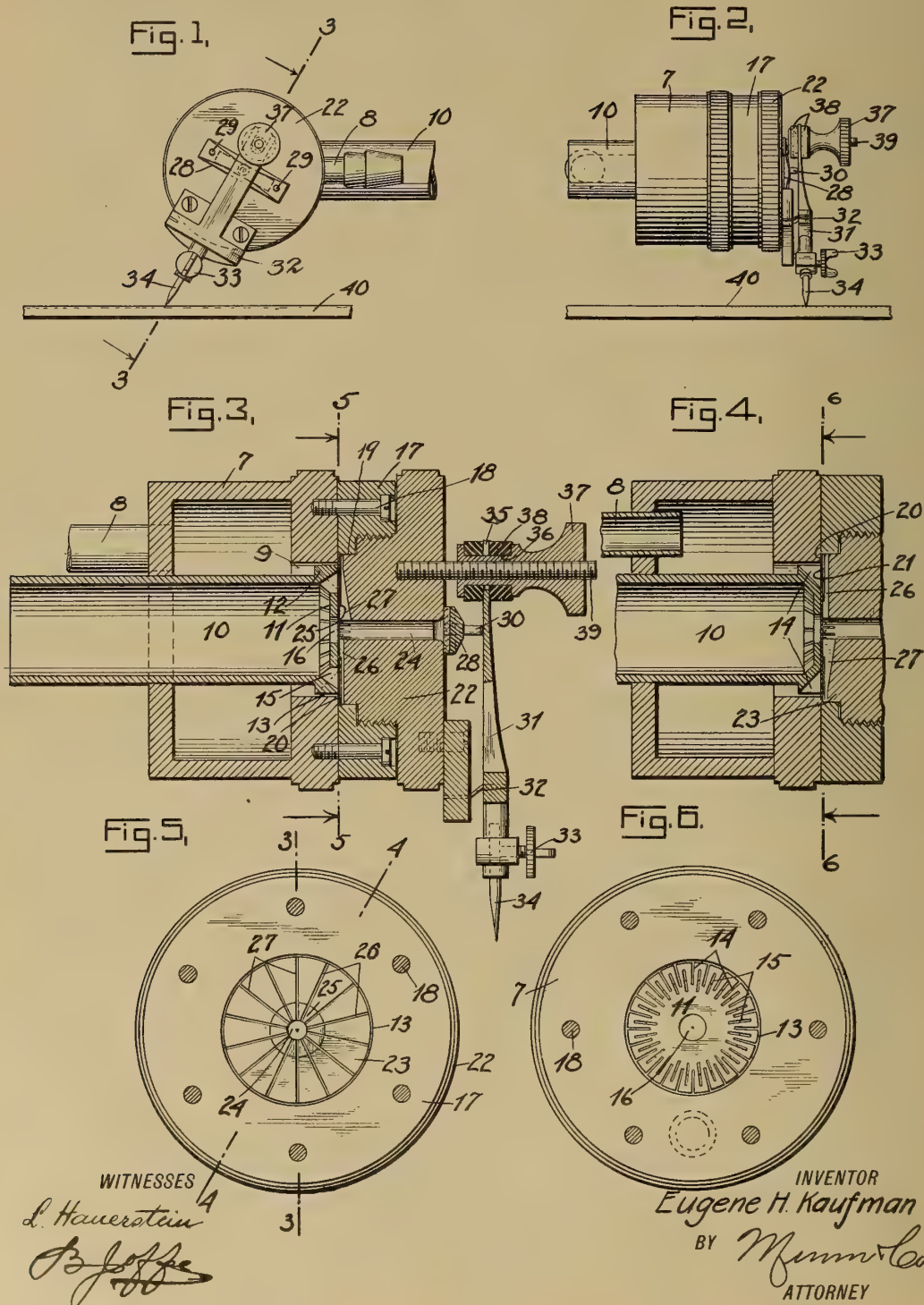
#1,151,472-----E. H. Kaufman,  
Patented-August 24, 1915.  
Filed-August 27, 1914.



E. H. KAUFMAN.  
SOUND BOX.  
APPLICATION FILED AUG. 27, 1914.

1,151,472.

Patented Aug. 24, 1915.



# UNITED STATES PATENT OFFICE.

EUGENE H. KAUFMAN, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO HARRISON W. ROGERS AND CHARLES W. EBELING, BOTH OF NEW YORK, N. Y.

## SOUND-BOX.

1,151,472.

Specification of Letters Patent. Patented Aug. 24, 1915.

Application filed August 27, 1914. Serial No. 858,819.

*To all whom it may concern:*

Be it known that I, EUGENE H. KAUFMAN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Sound-Box, of which the following is a full, clear, and exact description.

My invention relates to sound reproducing and recording instruments, and has reference more particularly to a sound box having a stylus bar, a diaphragm, and means for supplying an air current to the sound waves produced by the diaphragm whereby the sound waves produced at the diaphragm by the stylus bar are intensified.

The invention is also characterized by the provision of an exceedingly elastic medium between the stylus bar and the diaphragm.

Further, the sound box is characterized by having its diaphragm secured between the center and the periphery thereof. It is still further characterized by an air supply adapted to create a current from the side of the diaphragm not facing the stylus bar.

The object of the invention is to provide a strong, simple, inexpensive, and efficient sound box which is particularly adapted for use in large halls, theaters, hotels, etc., and the tone of which is not distorted although greatly magnified.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

In the accompanying drawings, forming part of the application, similar characters of reference indicate corresponding parts in all the views, and Figure 1 is a front elevation of the sound box; Fig. 2 is a side elevation thereof; Fig. 3 is a vertical, axial section on line 3—3, Fig. 1 or 3—3, Fig. 5; Fig. 4 is a similar section on line 4—4, Fig. 5; Fig. 5 is a cross section on line 5—5, Fig. 3; and Fig. 6 is a cross section on line 6—6, Fig. 4.

Referring to the drawings, 7 is an air drum having an eccentric inlet 8 at the rear end thereof and a central outlet 9 in the front thereof. Concentric with the drum is a tube 10, one end of which projects through the rear end of the drum, where the tubular member is rigidly secured thereto in any

suitable way and so that no air can pass between the rear end of the drum and the tubular member. The other end of the tube 10 is provided with an end wall 11, the outer surface of which is in alinement with the outer surface of the front end of the drum 7. The diameter of the air outlet is preferably greater than the exterior diameter of the tube 10; and the end of the tube within said air outlet is preferably enlarged to form a head 12, which is spaced by a small annular gap 13 from the wall of the air outlet 9.

The end wall 11 is provided with a series of end slits or notches 14 which facilitate the passage of the air from the drum through the outlet. It will be noted that these slits or notches do not pass to the interior of the tube 10 (see Fig. 4). The end wall 11 is also provided with a series of slits 15 not extending to the periphery, although extending farther toward the center of the tube than the end slits 14. The said slits 15 establish communication between the outer face of the end wall and the interior of the tube, while the slits 14 establish communication between the interior of the drum and the outer face of the end wall 11. It will be noted that all these slits are radial and that the slits 14 and 15 are in successive alternation. The end wall 11 is also provided with a central aperture 16 leading from the outer surface to the interior of the tube 10.

An annular member 17 is secured to the front end of the drum 7 by screws 18, or any other suitable means. The central bore 19 of the annular member is preferably larger than the central bore of the drum forming the outlet 9, so that an annular surface 20 is formed on the front end of the drum, which forms an additional surface for a diaphragm 21 which rests against the outer surface of the end wall 11. The bore 19 is enlarged toward its outer end and threaded to receive a plug or cap 22, the end 23 of which fits snugly into the bore 19 of the annular member 17. The plug 22 is provided with a central bore 24, and the face of the end 23 of the plug has an annular raised portion 25 adapted to clamp the diaphragm between the outer surface of the end wall 11 and the plug 22. The diaphragm I prefer to use is made of paper but it is understood that any other suitable material may be used; and it will be noted that by clamping the diaphragm as stated the same has two annular vibrating



regions, one at the center thereof and the other peripheral or marginal. The end 23 of the plug is provided with slits 26 and 27, preferably radiating from the center. The slits 26 have their bottoms perpendicular to the axis of the bore 24, while the slits 27 have their bottoms inclined to the axis of the plug, the depth of the slit increasing from the periphery toward the center, as best seen in Figs. 3 and 4. It will be noted from Fig. 5 that the slits 26 and 27 alternate. These slits establish communication between the bore 24 and the peripheral vibratory portion of the diaphragm, and also establish radial vibratory portions in the diaphragm by the portions of the slit cutting through the annular raised portion 25. That is to say, the diaphragm clamped by the cap or plug 22 has spaced non-vibratory portions intermediate the periphery and the center thereof, or the diaphragm has a central and peripheral vibrating portion united by radial vibrating portions. The bore 24 at the opposite end is enlarged, as shown in dotted line in Fig. 1, and thereat a valve 28 is provided. The valve 28 is guided in its movement by pins 29 carried by the cap 22. The valve has a stem 30 the extremity of which contacts with a stylus bar 31 secured to the plug 22 by members 32, which members have their ends jammed in the cap and the stylus bar and form supports for the stylus bar. The lower end of the stylus bar has a socket provided with a clamping member 33 whereby a needle 34 can be secured to the stylus bar. The upper end of the stylus bar 31 is bifurcated, as shown at 35, and therebetween a neck 36 of a cap 37 is engaged. The neck 36 carries a pair of rubber washers 38, one at each side of the stylus bar, whereby a resilient connection between the cap 37 and the stylus bar is formed. The cap 37 engages a threaded stud 39 carried by the plug 22. By moving the cap 37 on the stud 39 the pressure of the stylus bar on the valve 28 may be varied, and also thereby the displacement of the valve is varied. It will be noted that the valve 28 at one end of the bore 24 and the diaphragm at the other end thereof form an air column between the diaphragm and the stylus bar.

The vibration of the stylus bar received from the needle 34 moving on the disk 40 is transmitted to the valve 28, which sets the column of air in the bore 24 and the slits 26 and 27 into vibration. This vibration is transmitted to the diaphragm, as stated above, which is free to vibrate in the central and the peripheral parts thereof and also in parts connecting the central to the peripheral part of the diaphragm. This vibration of the diaphragm is transmitted to the air column in the tube 10. The current of air supplied to the drum 7 through the inlet 8 is preferably of about four to six pounds

pressure, and its main effect is on the peripheral part of the diaphragm through the slits 14 before it enters into the tube 10 through the slits 15 (see Fig. 4). This constant pressure of the air on the peripheral part of the diaphragm causes the air present in the bore 24 and the slits thereof to maintain the valve 28 in contact with the stylus bar 31; and the vibration of the stylus bar 31 controls the communication between the air column in the bore 24 and the atmosphere, and also sets the said column of air in the bore 24 into vibration, as above stated. It will be noted that the air from the drum 7 enters the tube 10 adjacent the periphery thereof, creating a current of air at the face of the diaphragm 21, not directly affected by the stylus bar. This air current causes the intensification of the sound waves produced in the tube 10 by the diaphragm under the influence of the stylus bar.

From the foregoing description, taken in connection with the accompanying drawings, the advantage of the construction and operation of the device shown will be readily understood by those skilled in the art to which the invention pertains; and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as are within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a sound box, a drum having an air inlet and an air outlet, a diaphragm at the outlet, means for securing the diaphragm at the outlet, whereby the peripheral part of the diaphragm is free to move to and from the air outlet of the drum, and a tubular member associated with said securing means and adapted to receive and direct the air coming from the drum outlet to the diaphragm.

2. In a sound box, a drum having an air inlet, a tube associated with the drum and forming therewith an annular air outlet from the drum, said tube having an apertured end wall at the air outlet, a diaphragm, and means for maintaining the diaphragm against the end wall and the annular outlet of the drum so that the peripheral part of the diaphragm is free to vibrate, said end wall having means for directing the air coming to the diaphragm from the air outlet of the drum to the interior of the tube.

3. In a sound box, a drum having an air inlet and an air outlet, a diaphragm controlling the air outlet with one face, a plug engaging the diaphragm at the opposite face, said plug having a central bore and an annular raised portion at the end engaging the



diaphragm whereby the same is secured intermediate its periphery and center, a valve at the other end of the bore, and a stylus bar co-acting with said valve, said plug having

5 radial slits at the end engaging the diaphragm whereby the air in the bore of the plug is in communication with the peripheral face of the diaphragm.

4. In a sound box, a tubular member having a centrally apertured end wall, said end wall having a series of radial end slits extending from the lateral surface of the tube to the outer surface of the end wall and a series of radial slits from the outer surface to the inner surface of the end wall, means for supplying an air current about the outer lateral surface of the tubular member adjacent the end wall, a diaphragm engaging the outer surface of the end wall and controlling the current of air, a centrally apertured plug clamping said diaphragm to the end wall, said plug having an annular raised portion whereby the diaphragm is clamped to the end wall between the center and periphery thereof, the end of the plug engaging the diaphragm having a series of radial slits establishing communication between the peripheral part of the diaphragm and the central bore of the plug, a valve controlling the communication of the bore with the atmosphere, and a stylus bar for influencing the movement of the valve.

5. In a sound box, a drum having an air inlet, a tube associated therewith and forming with the drum an annular air outlet therefrom, said tube having an apertured end wall at the annular air outlet, a diaphragm, and means for securing the diaphragm to the end wall in regions between the central and peripheral parts thereof, the peripheral face part of the diaphragm controlling the annular air outlet.

6. In a sound box, a drum having an air inlet, a tube associated therewith and forming with the drum an annular air outlet

therefrom, said tube having an end wall at the annular air outlet, a diaphragm, and means for securing the diaphragm to the end wall in regions between the central and peripheral parts thereof, the peripheral face of the diaphragm controlling the annular air outlet, said end wall having a series of slits directed from the lateral surface of the tube to the outer surface of the end wall and adapted to establish communication between the annular outlet and the peripheral face of the diaphragm, said end wall having also a series of slits connecting the outer surface of the end wall with the inner surface thereof, said second slits being adapted to direct the air from the diaphragm to the interior of the tube.

7. In a sound box, a diaphragm and means engaging the diaphragm so that the central and peripheral parts of the diaphragm are free to vibrate.

8. In a sound box, a diaphragm, and means engaging the diaphragm so that the central and peripheral parts of the diaphragm are free to vibrate, said diaphragm having at one face thereof radial portions which are not engaged by the means engaging the diaphragm, said radial portions extending from the peripheral to the central vibrating parts of the diaphragm.

9. In a sound box, a diaphragm, and means engaging the diaphragm so that the central and peripheral parts of the diaphragm are free to vibrate, said diaphragm having at each face thereof radially directed portions not engaged by the means engaging the diaphragm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EUGENE H. KAUFMAN.

Witnesses:

ALEX. YOKEL,  
HARRY RULIN.

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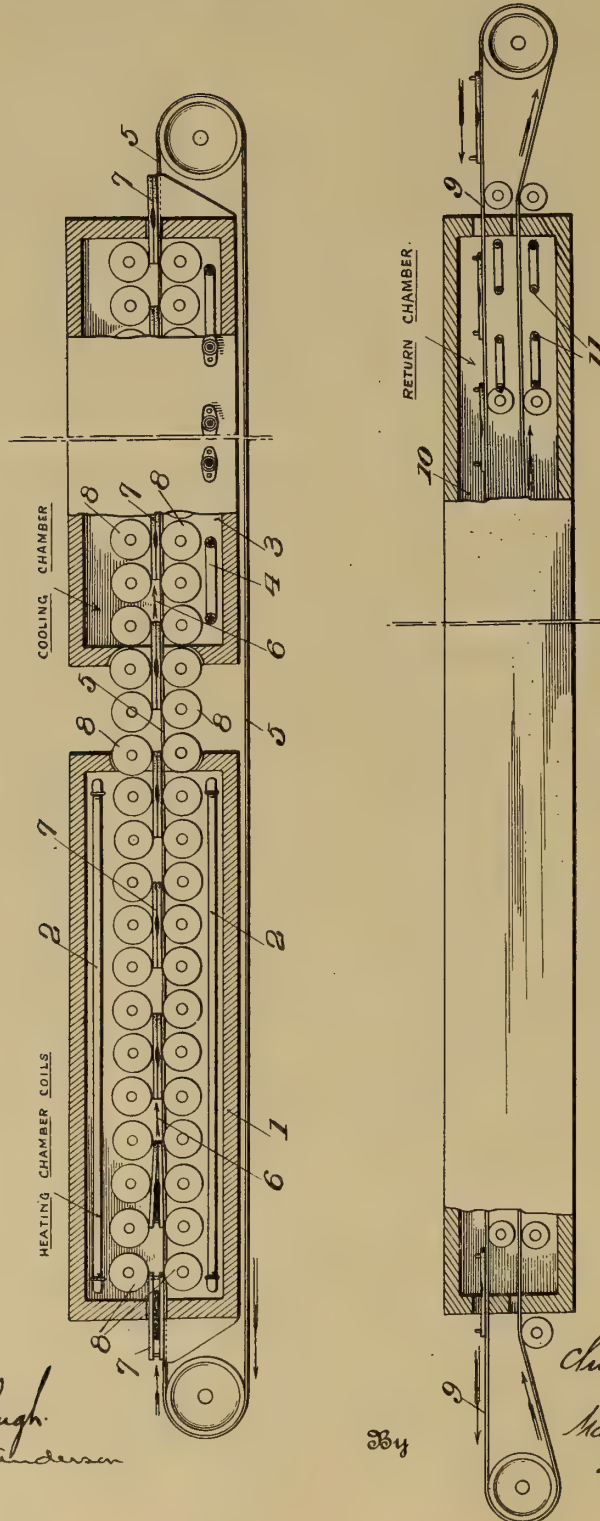
PROCESS OF PRESSING SOUND RECORDS,  
# 1,151,642-----Clinton E. Woods,  
Patented-August 31, 1915.  
Filed-July 15, 1913.



C. E. WOODS.  
 PROCESS OF PRESSING SOUND RECORDS.  
 APPLICATION FILED JULY 15, 1913.

1,151,642.

Patented Aug. 31, 1915.



Witnesses  
*Ruth C. Fitzhugh*  
*James H. Anderson*

Inventor  
*Clinton E. Woods.*  
 By *Mauro, Cameron,*  
*Lewis & Massie,*  
 Attorneys

# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN  
GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION  
OF WEST VIRGINIA.

## PROCESS OF PRESSING SOUND-RECORDS.

1,151,642.

Specification of Letters Patent. Patented Aug. 31, 1915.

Application filed July 15, 1913. Serial No. 779,185.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Process of Pressing Sound-Records, which invention is fully set forth in the following specification.

This invention relates to the art of pressing sound records, and has for its object to provide a process, in the practice of which the records may be efficiently pressed by the use of a matrix formed from the original sound record in any suitable manner in contact with plastic material capable of receiving the impression.

Heretofore in the practice of this art, it has been common to heat a suitable matrix and a suitable body of record material until such material became plastic, and then place the thermoplastic material on the matrix and subject the same to pressure while both the matrix and the record material are heated, and permit both the matrix and the material to slowly cool under pressure. This process consumes considerable time, since while it is not essential that the matrix and material should become absolutely cool, nevertheless the workman has to await a substantial cooling or reduction in temperature of the matrix and record material before removing the pressed record from the die.

My present invention is particularly designed to provide means whereby the records may be more rapidly pressed to the end that the number of pressmen employed in a factory of given capacity may be greatly reduced.

With this object in view, my invention consists in taking any suitable record matrix and any suitable record material capable of being rendered plastic by heat, and which I shall hereinafter refer to as thermoplastic material, placing said thermoplastic material when heated in contact with the heated matrix, and then passing said material and matrix through a heated chamber under pressure. In said chamber, which is preferably long and low, the temperature may be uniform throughout the extent of the chamber, or if desired, the temperature is lower at one end, say the entrance end, than at the exit end of the chamber and gradually increases from the entrance to the exit thereof. In some cases it may be found desirable

to have the temperature highest at the entrance end and gradually decreasing to the outlet end. After the record and matrix pass from the heated chamber, they are then exposed to a cooling atmosphere while still under pressure. Preferably this cooling atmosphere is obtained by passing the matrix and the record under pressure through a cooling or refrigerating chamber, but if desired, the cooling may be effected by exposure to a cooling atmosphere, such as a cooling blast, or otherwise. The matrix and record having been sufficiently cooled or reduced in temperature, the matrix is then separated from the record which is then ready for finishing in the usual or any suitable manner.

Preferably, before placing the thermoplastic material in contact with the heated matrix, a suitable centrally disposed label is placed upon the matrix which thus becomes securely affixed by adhesion to the finished record as the result of the process described, this being a common and well-known step in the art.

In the practice of my method, various forms of apparatus may be employed, one of which, for convenience in illustrating and explaining the invention is diagrammatically shown in the accompanying drawing, in which 1 is a heating chamber heated in any suitable manner, as by means of the steam pipes 2 passing therein; thereunder or thereover, and 3 is a refrigerating chamber adjacent to the heating chamber 1 and provided with suitable pipes 4 for conducting a refrigerating material into the chamber. The chambers 1 and 3 are supported on any suitable frame-work, and a continuous carrier 5 of any suitable material, such as metal, and of any suitable construction, is caused to progress through the chambers 1 and 3 in the direction indicated by the arrow 6, so as to pass from the heating chamber 1 into the refrigerating chamber 3 and then return to again repeat the operation. This carrier is provided with a series of suitably placed dies 7 for the reception of the matrices with the thermoplastic material in contact therewith, (the matrices and the thermoplastic material having been previously heated to the desired temperature), and a die plate is placed over the material in the usual way, and as the car-



rier 7 passes into the heated chamber, or if desired, before passing into the heating chamber, it is subjected to the action of pressure rolls 8 which subject the matrices and the thermoplastic material to a uniform, or if desired a gradually increasing, pressure. Preferably there is a series of sets of rolls 8, as indicated in the drawing. As the carrier progresses, the matrices and the thermoplastic material pass from the exit end of the heating chamber into the refrigerating chamber, the two chambers being preferably spaced apart as indicated in the drawing, and if desired, a set of pressure rolls may be mounted in the space between the two chambers. The farther progress of the carrier advances the matrices and the thermoplastic material into the cooling or refrigerating chamber, where they are still subjected to the action of the pressure rolls, and upon their exit from the refrigerating chamber, the operator removes the pressed record and the matrix from the dies in the carrier and then proceeds to reheat the matrix for repeating the operation. A convenient and preferred means for thus reheating the matrices consists of a return carrier 9 leading from near the exit end of the refrigerating chamber to near the entrance end of the heating chamber, and means are provided for reheating the matrices as they effect their return journey. This reheating means may be of any suitable or desired character. The return carrier itself may be heated or it may be covered with or caused to pass through a suitable heating chamber 10 provided with the heating pipes 11, the temperature of the carrier or the chamber, as the case may be, being carefully regulated to the end that the matrix may have attained the desired temperature upon reaching the entrance end of the heating chamber, when the matrix is again placed in the dies on the carrier with the thermoplastic material and the operation repeated.

While, for the purpose of clearly explaining the inventive idea, I have illustrated one form of apparatus which may be employed in practising my improved method of pressing sound records, I wish it to be distinctly understood that the invention is not in any way limited to the specific apparatus employed, since a variety of forms of apparatus may be used in practising the invention, without departing from the principle thereof.

By the use of my improved method, the number of workmen employed in pressing a given number of records is reduced from fifty to seventy-five per cent., and the uniformity in character of the resulting product greatly improved.

The apparatus shown and described herein is not specifically claimed in this specification, since it forms the subject-matter of another application.

Having thus described my invention, what is claimed is:—

1. The improved process of pressing sound records which consists in placing a heated matrix in contact with heated thermoplastic record material, passing the matrix and record material through a heated chamber under pressure, and then cooling the same.

2. The process of pressing sound records which consists in placing a heated matrix and heated thermoplastic record material in contact with each other, passing said matrix and material through a heated chamber under pressure, and then cooling said matrix and material under pressure.

3. The process of pressing sound records which consists in placing a heated matrix and heated thermoplastic record material in contact with each other, then passing said matrix and material through a heated chamber under pressure, and then cooling said matrix and material by exposing the same while under pressure to a cooling atmosphere.

4. The process of pressing sound records which consists in placing a heated matrix and a heated thermoplastic record material in contact with each other, then passing the matrix and material through a heated chamber under pressure, and then passing the same through a cooling chamber.

5. The process of pressing sound records which consists in placing a heated matrix and heated thermoplastic record material in contact with each other, passing said matrix and material through a heated chamber under pressure, and then passing said matrix and material under pressure through a cooling chamber.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

THOMAS STEVENTON,  
FRANK C. HINCKLEY, Jr.



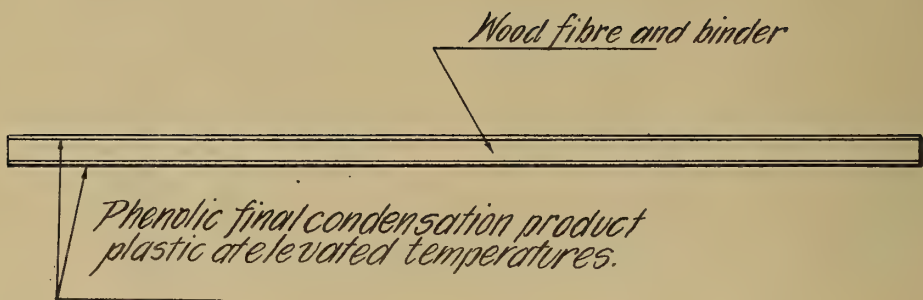
PHONOGRAPH PATENT.

SOUND RECORD AND OTHER OBJECT,  
#1,151,849-----J.W.Aylsworth & E. L. Aiken,  
Patented-August 31, 1915.  
Filed-September 10, 1914.

J. W. AYLSWORTH & E. L. AIKEN.  
SOUND RECORD AND OTHER OBJECT.  
APPLICATION FILED SEPT. 10, 1914.

1,151,849.

Patented Aug. 31, 1915.



*Witnesses:*

*N. L. Fisher*  
*Frederick Bachmann*

*Inventors:*

*Jonas W. Aylsworth*  
*and Edward L. Aiken*  
*by Dyer and Holden*  
*their Attys.*

# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, AND EDWARD L. AIKEN, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-RECORD AND OTHER OBJECT.

1,151,849.

Specification of Letters Patent.

Patented Aug. 31, 1915.

Original application filed August 6, 1910, Serial No. 575,981. Divided and this application filed September 10, 1914. Serial No. 861,038.

To all whom it may concern:

Be it known that we, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, Essex county, New Jersey, and EDWARD L. AIKEN, a citizen of the United States, and a resident of Springfield, Hampden county, Massachusetts, have invented certain new and useful Improvements in Sound-Records and other Objects, of which the following is a description.

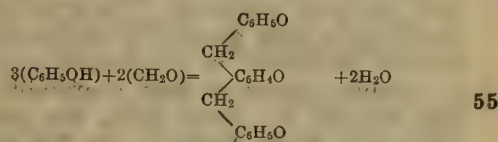
Our invention relates to molded objects, especially flat plates, such as disk sound records, and more particularly to the disk sound record and other molded objects formed by our improved process described and claimed in our application, Serial No. 575,981, filed August 6, 1910, of which this application is a division. By our improved process, molded objects are formed of resinous refractory condensation products of phenol or equivalent substances, and formaldehyde or other material containing active methylene ( $\text{CH}_2$ ) groups.

Our principal object is to produce as an article of manufacture various molded objects such as disk sound records, formed by our improved process, and having certain distinguishing characteristics which will hereafter be more fully pointed out.

Our process consists generally in the formation of a body or backing having a large proportion of an inert filling material incorporated therein, the formation of a surfacing layer, having a less proportion of filler or no filler, securing or forming the surfacing layer upon the body, and molding the object from the blank thus formed, while at the same time causing the reaction to ensue between the ingredients of the object or of the surface layer thereof by application of sufficient heat to form a final infusible and insoluble condensation product.

In carrying out our process, we prefer to proceed as follows:—A fusible soluble phenolic condensation product or phenol resin is formed. This is preferably the product formed by the reaction of substantially three parts of phenol to two parts of formaldehyde by molecular weights, the reaction ap-

parently taking place according to the equation—



as explained in applications of Aylsworth, Serial No. 494,060, filed May 14, 1909, entitled Plastic composition and process of manufacturing the same, and Serial No. 543,238, filed February 11, 1910, entitled Phenolic condensation product and method of preparing the same, upon which applications U. S. Patents Nos. 1,102,630 and 1,020,598 respectively have been granted. Whether or not the reaction takes place according to the equation given, the resulting condensation product is fusible and soluble in alcohol and other solvents and is a solid at normal temperatures. Apparently, this product contains no free formaldehyde or other free or active methylene-containing substance, and it is permanently fusible in the sense that it cannot be transformed into an infusible final condensation product by any amount of heating with or without pressure without the addition of formaldehyde, paraformaldehyde, hexa-methylene-tetra-amin, or other hardening agent, but upon being heated together with a sufficient quantity, as 10%, of such hardening agent, a transformation takes place changing the phenol resin into a final infusible insoluble condensation product, as is explained in the applications of Aylsworth above referred to. To make the blank or body of a disk sound record or other object to be molded, we prefer to dissolve the fusible condensation product or phenol resin obtained as above described in a liquid solvent for the same, preferably alcohol. A sufficient percentage of a methylene-containing or hardening agent is then dissolved in the solvent containing the phenol resin. We prefer to make use of hexa-methylene-tetra-amin in the proportion of about 10 per cent. of the phenol resin, and this is preferably first dis-



solved in a sufficient amount of water and added to the solution of the phenol resin in the alcohol, since the hexa-methylene-tetra-amin dissolves more readily in water than in alcohol. Next, an inert filling body such as dry wood pulp or other filling materials, such as are described in the applications of Aylsworth above referred to, are placed in a mixing machine, and if desired, a coloring material, such as lamp black, is added to the mixture. The solution of the phenol resin and the hardening agent is then poured into the mixing machine upon the filler and the components are thoroughly mixed together. The solvent is then removed as by evaporation, the alcohol preferably being recovered and used over and over. The dried mixture resulting is then ground to uniformity and molded preferably in a hydraulic press with a suitable amount of heat, preferably about 300 degrees F., steam heat, the blank or body thus being formed. In this molding operation, the hardening reaction between the phenol resin and the hexa-methylene-tetra-amin may take place to a limited extent, although it is only necessary that the materials be sufficiently heated to coalesce in the mold to form the blank. The filling body may be used with good results in the proportion of two or three to one by weight to the phenol resin. The proportions of the filler to the binder in the final hardened product, though slightly less than the proportions given, will be approximately the same.

The surface layer for the object to be molded is preferably formed as follows:—A sufficient amount of phenol resin, together with a hardening material, preferably hexa-methylene-tetra-amin, a plasticity agent, such as described in the applications of Aylsworth above referred to, and which is preferably chlorinated naphthalene, as mono-chloro-naphthalene, are ground together, with a percentage of an inert filler less than the percentage used in the case of the mixture for the blank above described. Preferably, a percentage of the blank mixture itself is used for incorporation with the other ingredients to provide the filling body. We have obtained good results with the following proportions:—phenol resin 100 parts; blank mixture 10 to 40 parts; mono-chloro-naphthalene 15 to 30 parts; hexa-methylene-tetra-amin 10 to 12 parts. Preferably, the hexa-methylene-tetra-amin in perfectly dry condition is first ground through a paint mill together with the chlorinated naphthalene, which is rendered liquid if necessary by heat. This operation results in the formation of a paste. The phenol resin is then ground and the desired amount of the blank mixture stirred into the same after the grinding, together with the

paste containing the hexa-methylene-tetra-amin and the chlorinated naphthalene. A damp powder results. The mixture thus formed is preferably now subjected to a more uniform mixing operation by running the same between heated mixing rolls. The mixture is then preferably formed into sheets by passing the same through heated calender rolls, the heat of the rolls being sufficient to cause the formation of the sheet, but not to cause the reaction between the ingredients. The surface layer in the form of sheets is then fixed to the blank in any suitable manner. In the case of a plate to be molded, such as a disk sound record, the heated blank together with a surfacing sheet is passed between warm rolls. In the case of a disk sound record which it is desired to mold upon both sides, a surface layer is secured to each side of the blank by passing the heated blank with the surfacing sheets on both sides of the same through the rolls. The plasticity agent referred to renders the surface sufficiently plastic at elevated temperatures to be pressed or molded. The blank is now ready to be molded and is placed in a suitable mold, heated sufficiently, and pressed preferably in a hydraulic press, the reaction ensuing between the ingredients of the composition while in the press to harden the molded object into a final infusible and insoluble product, the body and the surface layer being one homogeneous mass. Upon cooling, the finished molded object may be removed from the mold.

We prefer to use hexa-methylene-tetra-amin as a hardening agent for reasons given in applications of Aylsworth, Serial No. 543,236 and 543,238, upon which U. S. Patents Nos. 1,146,388 and 1,020,593 respectively have been granted, although para-formaldehyde or other methylene-containing substances may be used. During the final reaction, there is no evolution of dissociation gases, and counteracting pressure, accordingly, need not be used to prevent gassing in the composition, pressure being used only for the purpose of giving the object the desired form. In the case of various objects, it will not be necessary to perform the entire reaction within the mold during the shaping of the object, which may be transformed into its final infusible and insoluble form subsequently. In the case of various molded objects having exceedingly delicate surfaces, particularly sound records, the best result is attained by performing the final hardening reaction while the object is being pressed in the mold. The filling body used may be a final infusible phenolic hard condensation product ground fine and mixed with the other ingredients, in place of wood pulp or other organic or inorganic fillers. This is mentioned in applications of Ayls-



worth, Serial No. 543,236, above referred to, and Serial No. 575,970, filed August 6, 1911, upon which last named application U. S. Patent No. 1,102,631 has been granted.

5 In the drawing forming part of this specification is shown a side elevation of one embodiment of my invention, the materials employed in the said embodiment being described on the drawing.

10 It is obvious that our invention is not limited to the particular details described, but that the latter may be modified within the scope of the appended claims without departing from the spirit of the invention.  
 15 The body of the record or other object formed should upon molding make a homogeneous mass with the surface layer, to obtain the best results, but for some purposes the body may be formed of an inert filler and a binder other than a phenolic condensation product, particularly if the body is of material having substantially the same coefficient of expansion as the surface layer which in such case is in the nature of a veneer applied to the backing.  
 20  
 25

Having now described our invention, what we claim and desire to protect by Letters Patent is as follows:

1. As a new article of manufacture, a  
 30 sound record or blank comprising a body of suitable material and a surface layer containing a final hardened phenolic condensation product having incorporated therewith a substance which renders the surface layer  
 35 sufficiently plastic at elevated temperatures to be pressed or molded, substantially as described.

2. As a new article of manufacture, a  
 40 sound record or blank comprising a body containing a filler and a binding agent and a surface layer containing a final hardened phenolic condensation product having incorporated therewith a substance which renders the surface layer sufficiently plastic at elevated temperatures to be pressed or molded,  
 45 substantially as described.

3. As a new article of manufacture, a  
 50 sound record or blank comprising a body of suitable material and a surface layer containing a final hardened condensation product formed from a permanently fusible phenol resin and a material containing an active methylene group, substantially as described.

4. As a new article of manufacture, a  
 55 sound record or blank comprising a body of suitable material and a surface layer containing a final hardened condensation product formed of a phenol resin and a material containing an active methylene group, said  
 60 product having a plasticity agent incorporated therewith, substantially as described.

5. As a new article of manufacture, a  
 sound record or blank comprising a body containing a filler and a phenolic binding

agent therefor and a surface layer contain- 65  
 ing a phenolic condensation product, substantially as described.

6. As a new article of manufacture, a  
 sound record or blank comprising a body containing a condensation product of a phenol and a substance containing the methylene radical, and a surface layer containing a final hardened phenolic condensation product having a plasticity agent incorporated therewith, substantially as described. 75

7. As a new article of manufacture, a  
 sound record or blank comprising a body containing a final hardened condensation product formed of a phenol and a substance containing an active methylene group, and a surface layer containing a final hardened phenolic condensation product having a plasticity agent incorporated therewith, substantially as described. 80

8. As a new article of manufacture, a  
 85 sound record or blank comprising a body containing a filler and a binder formed of a condensation product of a phenol and a substance containing an active methylene group, and a surface layer containing a final hardened phenolic condensation product having a plasticity agent incorporated therewith, substantially as described. 90

9. As a new article of manufacture, a  
 sound record or blank comprising a body containing a filler and a binder formed of a final hardened condensation product of a phenol and a substance containing an active methylene group, and a surface layer containing a final hardened phenolic condensation product having a plasticity agent incorporated therewith, substantially as described. 95

10. A flat sound record or other object having a body of suitable material and a surface layer containing a hardened phenolic condensation product on both sides or faces of said body, said product having incorporated therewith a substance which renders the surface layer sufficiently plastic at elevated temperatures to take a clear impression from a sound record matrix, substantially as described. 100

11. A flat sound record or other object having a body containing a filler and a binding agent therefor and a surface layer containing a hardened phenolic condensation product on both sides or faces of said body, said product having incorporated therewith a substance which renders the surface layer sufficiently plastic at elevated temperatures to take a clear impression from a sound record matrix, substantially as described. 105

12. A flat sound record or other object having a body containing a phenolic filler and a binding agent therefor and a surface layer containing a hardened phenolic condensation product on both sides or faces of said body, said product having incorporated 110



therewith a substance which renders the surface layer sufficiently plastic at elevated temperatures to take a clear impression from a sound record matrix, substantially as described.

13. A flat sound record or other object having a body containing a hardened phenolic condensation product and a filler and a surface layer containing a hardened phenolic condensation product on both sides or faces of said body, said product having incorporated therewith a substance which renders the surface layer sufficiently plastic at elevated temperatures to take a clear impression from a sound record matrix, substantially as described.

14. As a new article of manufacture, a sound record or blank comprising a body containing a filler of wood fiber and a binder therefor containing a phenolic condensation product, and a surface layer for said body containing a hardened phenolic condensation product, said surface layer being sufficiently thermo plastic to take when heated a clear impression from a sound record matrix, substantially as described.

15. As a new article of manufacture, a sound record or blank comprising a body containing a filler of wood fiber and a binder therefor containing a phenolic condensation product, the wood fiber being in excess of the binder, and a surface layer containing a hardened phenolic condensation product, said surface layer being sufficiently thermo plastic to take when heated a clear impression from a sound record matrix, substantially as described.

16. As a new article of manufacture, a sound record or blank comprising a body containing a filler of wood fiber and a binder therefor containing a hardened phenolic condensation product, the wood fiber being in excess of the binder, and a surface layer containing a hardened phenolic condensation product, said surface layer being sufficiently thermo plastic to take when heated a clear impression from a sound record matrix, substantially as described.

17. As a new article of manufacture, a

sound record or blank comprising a body containing a filler of wood fiber and a binding agent and a surface layer containing a final hardened phenolic condensation product having incorporated therewith a substance which renders the surface layer sufficiently plastic at elevated temperatures to be pressed or molded, substantially as described.

18. As a new article of manufacture, a sound record or blank comprising a body containing a filler of wood fiber and a resinous binding agent and a surface layer containing a final hardened phenolic condensation product having incorporated therewith a substance which renders the surface layer sufficiently plastic at elevated temperatures to be pressed or molded, substantially as described.

19. As a new article of manufacture, a sound record or blank comprising a body containing a filler and a binding agent, the filler being in excess of the binding agent, and a surface layer containing a final hardened phenolic condensation product having a plasticity agent incorporated therewith, substantially as described.

20. As a new article of manufacture, a sound record or blank comprising a body containing a filler of wood and a binding agent, the filler being in excess of the binding agent, and a surface layer containing a final hardened phenolic condensation product having a plasticity agent incorporated therewith, substantially as described.

This specification signed by me, the said JONAS W. AYLSWORTH, and witnessed on my behalf the 2nd day of September, 1914, and signed by me, the said EDWARD L. AIKEN, and witnessed on my behalf the 3rd day of September, 1914.

JONAS W. AYLSWORTH.

Witnesses:

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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



GRAMOPHONE,  
#1,152,343-----J Saunders,  
Patented-August 31, 1915.  
Filed-September 16, 1903.

J. SANDERS.  
GRAMOPHONE.

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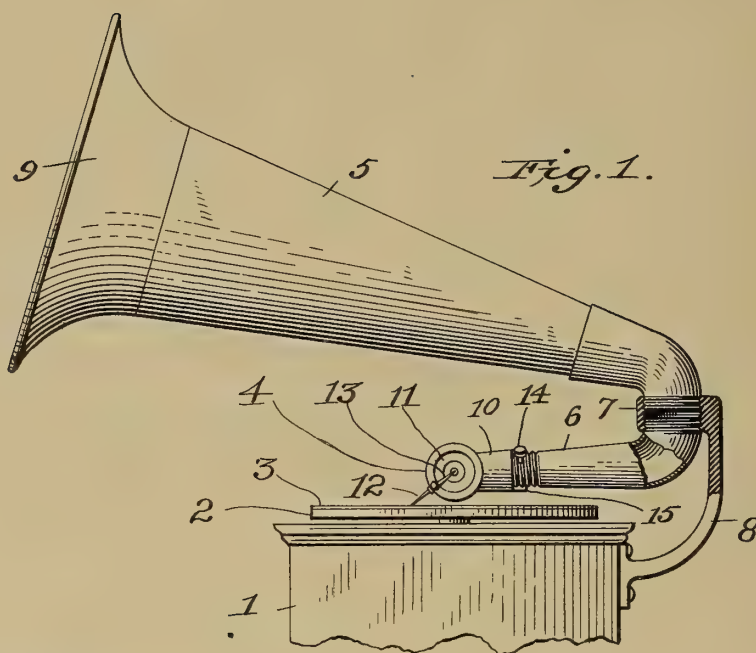
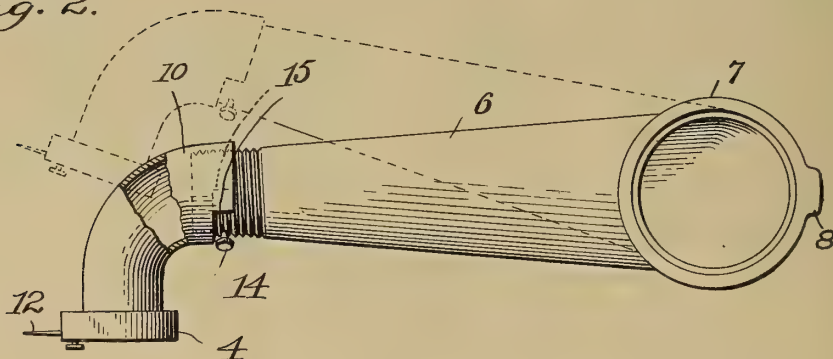


Fig. 2.



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# UNITED STATES PATENT OFFICE.

JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

GRAMOPHONE.

1,152,343.

Specification of Letters Patent.

Patented Aug. 31, 1915.

Application filed September 16, 1903. Serial No. 173,446.

*To all whom it may concern:*

Be it known that I, JOSEPH SANDERS, a citizen of the United States, and resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

The main objects of this invention are to provide in a talking machine, improved means, of simple and effective construction, for supporting a sound reproducer to swing across and toward and away from a sound record; to provide improved sound amplifying means; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary side elevation partly in vertical section of a talking machine constructed in accordance with this invention; and Fig. 2 an enlarged top plan view of a portion of the same.

Referring to these drawings, one embodiment of this invention comprises the usual or any suitable cabinet 1 upon which is mounted a horizontal rotary disk record support 2 adapted to carry a disk record 3 and actuated by any suitable motor, (not shown), arranged as usual in the cabinet 1. Arranged to cooperate with a sound record 3 upon the record support 2, is a sound box or sound reproducer 4, which is connected to and in communication with the smaller end of a sound amplifier or amplifying horn, as will appear hereinafter.

The sound amplifier or amplifying horn comprises two longitudinally tapering tubular sections 5 and 6 of unequal lengths, the longer one, 5, of which forms the major portion of the horn, and the shorter one, 6, of which is interposed between the longer section and the sound box and forms a sound box arm or tone arm. These two sections, 5 and 6, are connected and entirely supported to swing freely and independently of each other about a common vertical axis, by means of a stationary horizontal coupling 7, which is interposed between the smaller or inlet end of the longer section 5 and the larger or delivery end of the shorter section 6, and which is preferably rigidly supported in a plane above the record support 2 by a bracket 8 secured to and projecting upwardly from the cabinet 1.

To effect an extremely simple and efficient connection between the coupling 7 and the

tapering horn sections 5 and 6, the coupling 7 is preferably annular in form and provided with internal screw threads and the adjacent ends of the horn sections 5 and 6 are provided with corresponding external screw threads which engage the internal threads of the coupling. These screw threads are carefully proportioned to permit of a practically free rotary movement about a vertical axis of the tone arm 6 and of the major portion 5 of the horn, but at the same time to avoid any rattling or undesirable looseness between these parts, and if the joint be so made that the parts will unscrew while the tone arm 6 is being propelled across the record by the action of the record as will appear hereinafter, the freedom of movement of the tone arm will be increased thereby.

The longer section 5 of the horn throughout the greater part of its length is substantially straight in longitudinal axis and is inclined upwardly at a slight angle to the horizontal and terminates at its outer or discharge end in an outwardly flaring bell 9, and the inner part of the larger portion 5 is curved downwardly to meet the coupling 7. The tone arm or smaller section 6 of the horn is straight and substantially horizontal from its smaller end to a point near its larger end and then curves upwardly to meet the coupling 7, the horizontal portion of the tone arm being spaced a small distance above the sound record 3.

To provide a simple and efficient connection between the sound box 4 and the free end of the tone arm 6 which will permit of a practically free movement of the sound box with respect to the arm in a vertical plane, the sound box 4 is carried by and communicates with the smaller end of a hollow longitudinally tapering quadrantal neck 10 which is provided at its larger end with internal screw threads which engage corresponding external screw threads provided therefor on the free end of the tone arm 6, the external and the internal screw threads being carefully proportioned to permit of a practically free rotary movement of the sound box 4 and the neck 10 with respect to the tone arm 6, about the longitudinal axis of the free end of the tone arm.

The sound box 4 is provided with the usual or any suitable diaphragm 11 which



is actuated by means of the usual stylus or needle 12 carried by the usual stylus bar 13, the arrangement being such that when the stylus 12 is in operative engagement with the sound record 3, the diaphragm will be substantially perpendicular to the record 3 and substantially parallel to the longitudinal axis of the free end of the tone arm.

To support the sound box in an inoperative inverted position above the plane of the sound record, or in an inoperative position, projecting slightly below the plane of the record, a stop 14 projects from the tone arm 6 in the path of and coöperating with two shoulders 15 found on the threaded end of the neck 10 by cutting a portion thereof, one of the shoulders being arranged to come into contact with the stop 14 when the sound box has been rotated about the tone arm from an operative position upwardly and into an inoperative position just beyond the vertical and to hold the sound box in the latter position, and the other shoulder being arranged to engage the stop 14 when the sound box has been removed laterally from the record and has been lowered or permitted to fall to a point slightly below the plane of the record, and to hold the sound box in the latter position.

It is thought that the operation of this device is evident from the foregoing description, it being understood that the stylus or needle 12 engages and coöperates with the sound record preferably in a well known manner in a sound undulating groove provided therefor in the record, and is vibrated and propelled across the record by and in accordance with the walls of the sound groove, the vibratory movement of the stylus being transmitted to the diaphragm 11 and by the diaphragm transferred into sound waves. In the operation of this device, the longitudinal portion of the tone arm 6 swings in a predetermined path which is nearly but not quite horizontal or parallel to the record support and by suitably proportioning the pitch of the threads supporting the tone arm, the actual bodily movement of the tone arm toward the record during sound reproduction may be limited to less than one three hundredths of an inch.

It is to be noted that the construction of the sectional sound conduit leading from the sound box is such that the sound waves reproduced by the sound box pass from the sound box consecutively through the neck 10, tone arm 6 and horn section 5 and are delivered or discharged through the bell 9. It is evident that owing to the tapering construction of the sound box neck 10, the tone arm 6, horn section 5 and bell 9, the sound waves reproduced by the sound box are gradually and increasingly amplified all the way from the sound box to the delivery end of the bell 9.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent is,

1. In a talking machine, the combination of a record support, a sound box arm movable across said record support, and a sound box disposed laterally on one side of the longitudinal axis of said arm and movable with said arm across the record support, said sound box being also freely movable relatively to said arm about an axis coincident with the longitudinal axis of the arm to follow a record on said support.

2. In a talking machine, the combination of a record support, a sound box arm movable across said record support, and a sound box carried by and movable with said arm across said record support, the center of gravity of said sound box being arranged on one side of the longitudinal axis of said arm, and the sound box being freely movable relatively to said arm about an axis coincident with the longitudinal axis of said arm to follow a record on said support.

3. In a talking machine, the combination of a record support, a hollow sound conveying arm mounted to swing across said record support, a sound box having a diaphragm arranged in the operative position of said sound box in a plane substantially perpendicular to the surface of said record support, said sound box being disposed in its operative position on one side of the longitudinal axis of said arm, a coupling member connecting said sound box to said arm to move therewith across the record support, said coupling member being also rotatable with respect to said arm about an axis coincident with the longitudinal axis of said arm to bring said sound box into or out of operative relation to said record support, and means between said coupling member and said arm for holding the former in position with said sound box in inoperative relation to said record support.

4. In a talking machine, the combination of a record support, a hollow sound conveying arm mounted to swing in a fixed path across said record support, a sound box, and means coupling said sound box to said arm to move therewith across said record support, and to move freely relatively thereto about an axis coincident with the longitudinal axis of said arm, both to follow a record on said support in the reproduction of sound, and to assume an inoperative position with respect to said record support when the machine is not in use.

5. In a talking machine, the combination of a record support, a hollow sound conveying arm mounted to swing in a fixed path across said record support, a sound box, means coupling said sound box to said arm to move therewith across said record support, and to move freely relatively thereto



about an axis coincident with the longitudinal axis of said arm, both to follow a record on said support in the reproduction of sound, and to assume an inoperative position with respect to said record support when the machine is not in use, and means between the aforesaid means and said arm, for holding said sound box in inoperative position.

6. In a talking machine, the combination of a sound box and a sound amplifying horn affording a gradually widening sound passage, composed of two sections axially joined by a screw-threaded coupling and movable with reference to each other, and a quadrantal neck carrying the sound box and axially joined to the small end of the horn by engaging screw-threads, so as to render the neck freely movable about the axis of the horn at its small end.

7. In a talking machine, the combination of a record support, a hollow sound conveying arm mounted to swing in a fixed plane across said record support, a sound box, and a rigid elbow coupling said sound box to said arm to move therewith across said record support, and to move freely relatively thereto about an axis coincident with the longitudinal axis of said arm, both to follow a record on said support in the reproduction of sound, and to assume an inoperative position with respect to said record support when the machine is not in use.

8. A sound amplifying horn composed of two hollow successively related members of constantly increasing cross section from one end of one member to the other end of the other member and swinging independently one of the other in parallel planes; one member being also movable bodily to and from the plane of movement of the other member in the normal operation thereof.

9. In a sound reproducing machine, a sound amplifying horn composed of two hollow successively related members of constantly increasing cross section from one end of one member to the other end of the other member, and swinging independently one of the other in substantially parallel planes, one member being movable across the record tablet by the engagement of the stylus with the record groove and at the same time gravitating bodily toward the tablet.

10. A sound amplifying horn composed of two independently movable members connected together by a screw-thread swivel joint, and a sound box carried by one of said members and movable freely therewith relatively to the other member.

11. In a sound reproducing machine, a sound amplifying horn composed of two hollow successively related members, one swinging independently of the other in a plane substantially parallel to the other,

said member being movable across the record tablet by the engagement of the stylus with the record groove and at the same time gravitating bodily toward the tablet.

12. In a talking machine, a tone-arm formed of fixed and movable sections, the movable sections being connected to permit free movement of one of such sections about a horizontal axis, and a screw-thread connection uniting the movable sections to a fixed section of the arm.

13. In a talking machine, the combination with a support, of a sound reproducer arm connected to said support by means of a screw thread and movable freely with respect to said support about the axis of said thread, and sound reproducing means carried by said arm.

14. In a talking machine, the combination with a fixed support, of a sound reproducer arm connected to said support by means of a screw thread and movable freely with respect to said support about the axis of said thread, and sound reproducing means carried by said arm.

15. In a talking machine, the combination with a record support, of a sound reproducer arm mounted to swing across said support, and sound reproducing means carried by said arm and arranged to coöperate with a sound record on said support, said arm being arranged to gravitate bodily toward said support during its movement across said support.

16. In a talking machine, the combination with a hollow support, of a sound conveying arm telescoping with said support and having a screw threaded connection therewith and movable freely with respect to said support about the axis of said thread, and sound reproducing means carried by said arm.

17. In a talking machine, the combination of a record support, a hollow supporting member, a hollow sound conducting arm telescoping with said member and having a screw threaded connection therewith and movable freely with respect to said member about the axis of said thread to traverse said record support, and a sound box carried by said arm.

18. In a talking machine, the combination with a tubular sound box arm, of a sound box, and a hollow quadrantal neck carrying the sound box and axially joined to one end of said arm by screw threads, said neck and said sound box being freely movable about the longitudinal axis of said end.

19. In a talking machine, the combination of a record support, a relatively stationary member, a hollow sound conveying arm having a screw threaded connection with said member, to swing across said record support, and a sound box carried by the free end of said arm and movable therewith across said record support and also movable



freely independently of said arm toward and away from said record support.

20. In a talking machine, the combination of a record support, a hollow supporting member, a hollow sound conveying arm having a screw threaded connection with said member, to swing across said record support, a sound box carried by the free end of said arm and movable therewith across said record support, and a joint in said arm between said sound box and said screw threaded connection permitting said sound box to move freely toward and away from said record support independently of the movement about said screw threaded connection.

21. In a talking machine, the combination with a substantially horizontal disk record support, of a sound box arm mounted to move in a predetermined path, and a sound box carried by said arm and arranged to cooperate with a record on said support, said sound box being freely rotatable through a limited arc with respect to said arm about an axis substantially coincident with the longitudinal axis of one end of said arm, and said sound box, when at one end of said arc, being in an inverted position above said record support and entirely supported by said arm, and said sound box, when at the other end of said arc, being in a position projecting below its normal operative position, and being entirely supported by said arm.

22. In a talking machine, the combination of a rotary record support, an arm mounted to move across said support, and a sound box carried by said arm and movable therewith across said support and having a stylus arranged to engage a record on said support at a point spaced on one side of a plane substantially perpendicular to the surface of said record support and coincident with the longitudinal axis of said arm, said sound box being arranged to rotate freely about an axis coincident with the longitudinal axis of said arm, to permit the sound box to follow a record on said support and to be turned about said axis to an inoperative position.

23. In a talking machine, the combination of a record support, a hollow sound box arm, and means mounting said arm to swing across said record support and to move bodily toward and away from said record support by and upon said swing movement.

24. In a talking machine, the combination of an arm, a record support across which said arm is movable, a sound box carried by and movable with said arm and disposed laterally on one side thereof and having a diaphragm arranged substantially perpendicularly to said record support in the operative position of said sound box, said sound box being movable about an axis ex-

tending longitudinally of said arm to an inoperative position relative to said support, and means for holding said sound box in inoperative position.

25. In a talking machine, the combination with a rotary record support, of a hollow sound reproducer arm mounted to move in a predetermined path with respect to said support, and sound reproducing means carried by and communicating with said arm and arranged to rotate freely with respect thereto about an axis coincident with the longitudinal axis of said arm, said sound reproducing means being provided with a stylus arranged to engage a record on said support at a point spaced horizontally from a vertical plane coincident with the said axis of rotation of said sound reproducing means.

26. In a talking machine, the combination with a rotary record support, of a hollow sound reproducer arm mounted to move in a predetermined path with respect to said support, a longitudinally curved hollow neck having one end axially jointed to one end of said arm, and sound reproducing means secured to and communicating with the other end of said neck, said neck being freely rotatable with respect to said arm about the longitudinal axis of said end of said arm, and said sound reproducing means being provided with a stylus arranged to engage a record on said support at a point spaced horizontally from a vertical plane coincident with the said longitudinal axis of said end of said arm.

27. In a talking machine, the combination with a rotary record support, of a hollow tone arm, mounted to move in a predetermined path with respect to said support, and sound reproducing means carried by said arm and arranged to rotate freely with respect thereto about an axis extending longitudinally of said arm, said sound reproducing means being provided with a stylus arranged to engage a record on said support at a point spaced horizontally from a vertical plane coincident with the said axis of rotation of said sound reproducing means, said sound reproducing means being freely invertible from an operative to an inoperative position with respect to said arm, and being entirely supported by said arm when in said inoperative position.

28. In a talking machine, the combination with a rotary record support, of a hollow tone arm, mounted to move in a predetermined path with respect to said support, sound reproducing means carried by said arm and arranged to rotate freely with respect thereto about an axis extending longitudinally of said arm, said sound reproducing means being provided with a stylus arranged to engage a record on said support at a point spaced horizontally from a vertical plane coincident with the said axis



of rotation of said sound reproducing means, said sound reproducing means being freely invertible with respect to said arm from an operative to an inoperative position and means carried by said arm for holding said sound reproducing means in an inoperative position.

29. In a talking machine, the combination with a rotary record support, of an arm mounted to move in a predetermined path with respect to said support, and sound reproducing means carried by said arm and arranged to rotate freely with respect thereto about an axis extending longitudinally of said arm, said sound reproducing means being provided with a stylus arranged to engage a record on said support at a point spaced horizontally from a vertical plane coincident with the said axis of rotation of said reproducing means.

30. In a talking machine, the combination with a hollow arm movable in a fixed plane, and a sound box mounted on the free end of said arm and so disposed that the sound box is free to rise and fall, turning about the longitudinal axis of said arm as a center during the reproduction of sound.

31. In a talking machine, the combination with a hollow arm and a record support over which said arm is mounted to move, of a sound box secured to said arm on an axis coincident to the longitudinal axis of said arm, and so disposed with respect to said arm that said sound box is free to rise and fall turning about said axis as a center during the reproduction of sound.

32. In a talking machine, the combination of an arm and a record support over which said arm is mounted to move, a sound box, and means connected to said sound box and telescoped into the free end of said arm and free to turn about an axis coincident with the longitudinal axis of said arm, said sound box being so disposed at one side of said

arm that said sound box is free to rise and fall, turning about said axis as a center in the reproduction of sound.

33. In a talking machine, the combination of a tubular tone arm normally extending toward the record to be played and pivoted to swing in a horizontal plane, a sound box tube having a rectangular bend therein, one arm of which tube is connected to said tone arm to permit the other arm of said tube to oscillate in a vertical plane, and means for permitting a free but limited oscillation of said sound box tube around the axis of said tone arm.

34. In a talking machine, the combination of a tubular tone arm normally extending toward the record to be played and adapted to swing in a horizontal plane, a sound box tube connected to the free end of, and in axial alinement with said tubular tone arm, said sound box tube having a rectangular bend therein near its free end, and means upon said tone arm and said sound box tube for permitting a free but limited oscillation of said sound box tube around the axis of said tone arm.

35. In a talking machine, the combination of a tubular tone arm normally extending toward the record to be played and adapted to swing in a horizontal plane, a sound box tube connected to the free end of said tone arm and in axial alinement therewith, a circumferential slot in said sound box tube, and a pin inserted into said tone arm for engagement with said slot whereby said sound box tube may have a free but limited axial oscillation with respect to said tone arm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH SANDERS.

Witnesses:

F. T. CHAPMAN,  
HUGH M. STERLING.



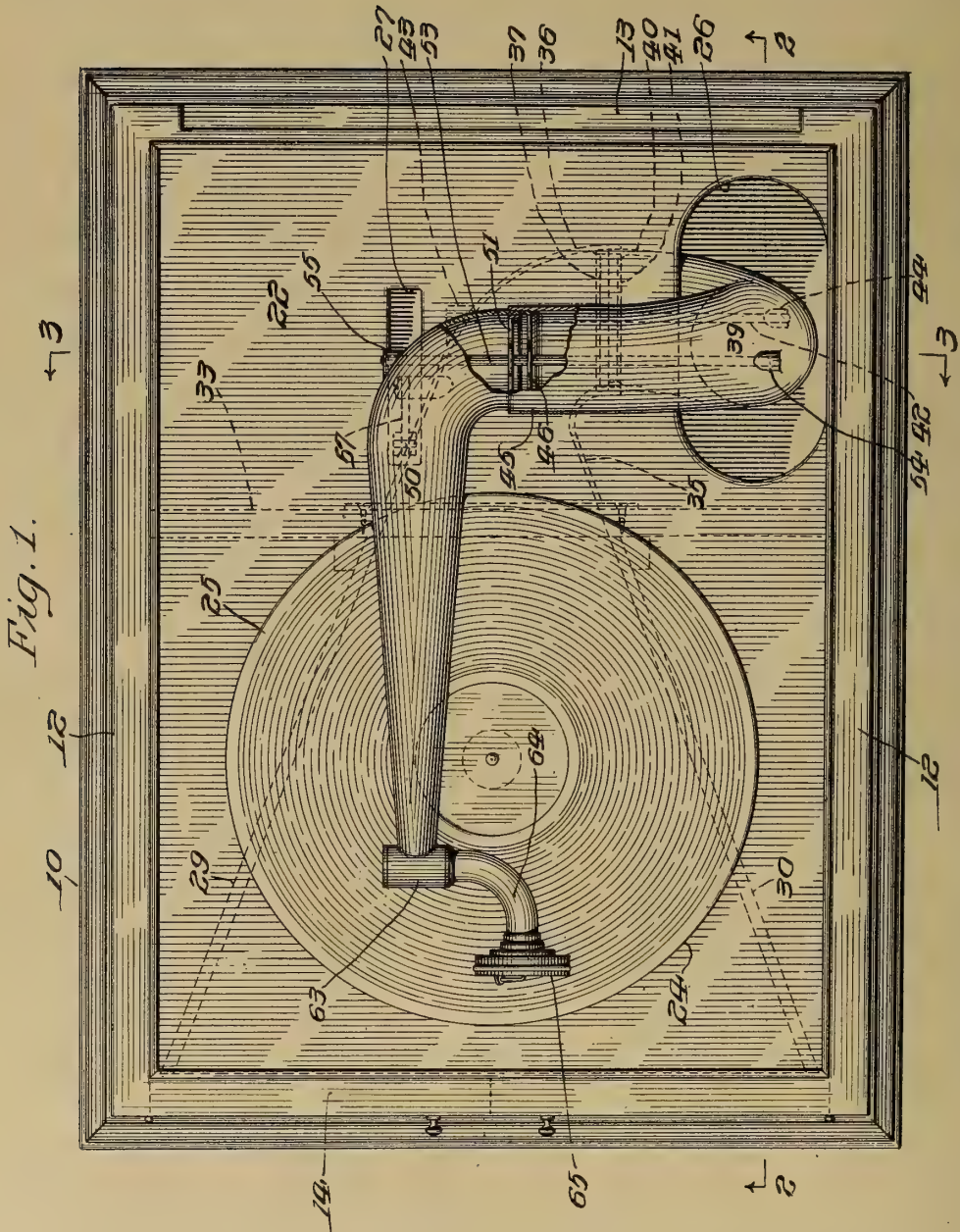
TALKING MACHINE,  
#1,152,401-----W. N. Dennison,  
Patented-September 7, 1915.  
Filed-July 31, 1911.



W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED JULY 31, 1911.

1,152,401.

Patented Sept. 7, 1915.  
6 SHEETS—SHEET 1.



WITNESSES

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BY

INVENTOR  
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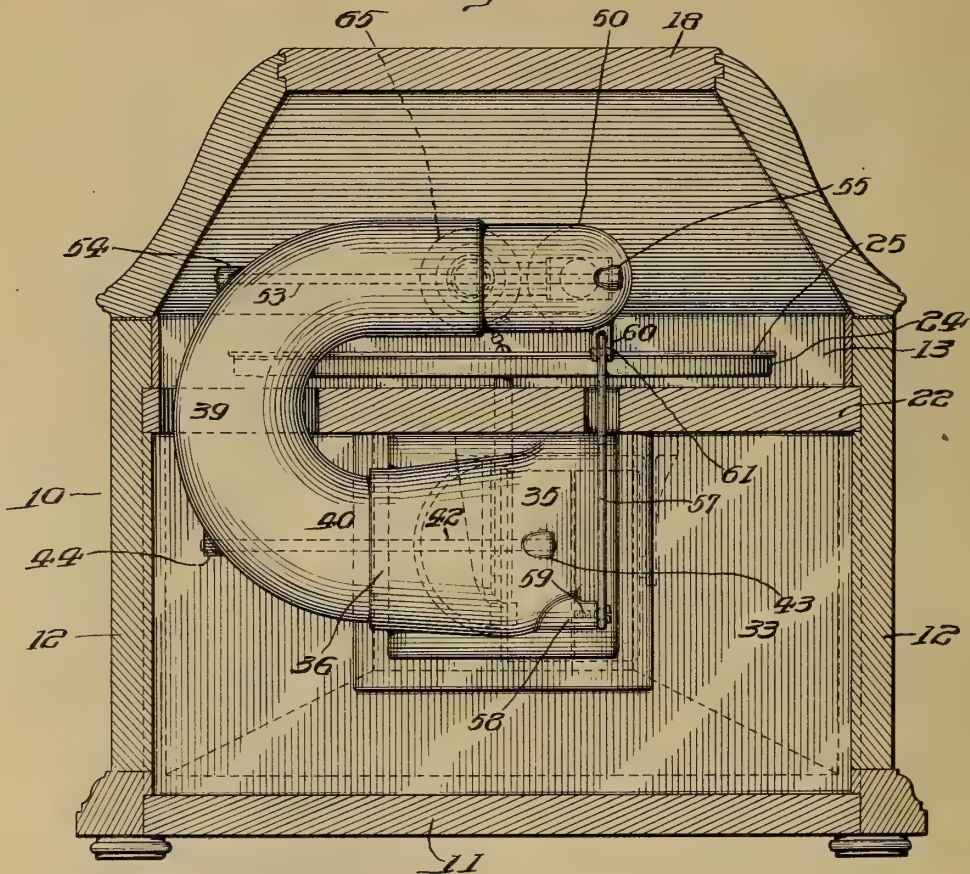
W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED JULY 31, 1911.

1,152,401.

Patented Sept. 7, 1915.

6 SHEETS—SHEET 3.

Fig. 3.



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*1 true. Pett.*

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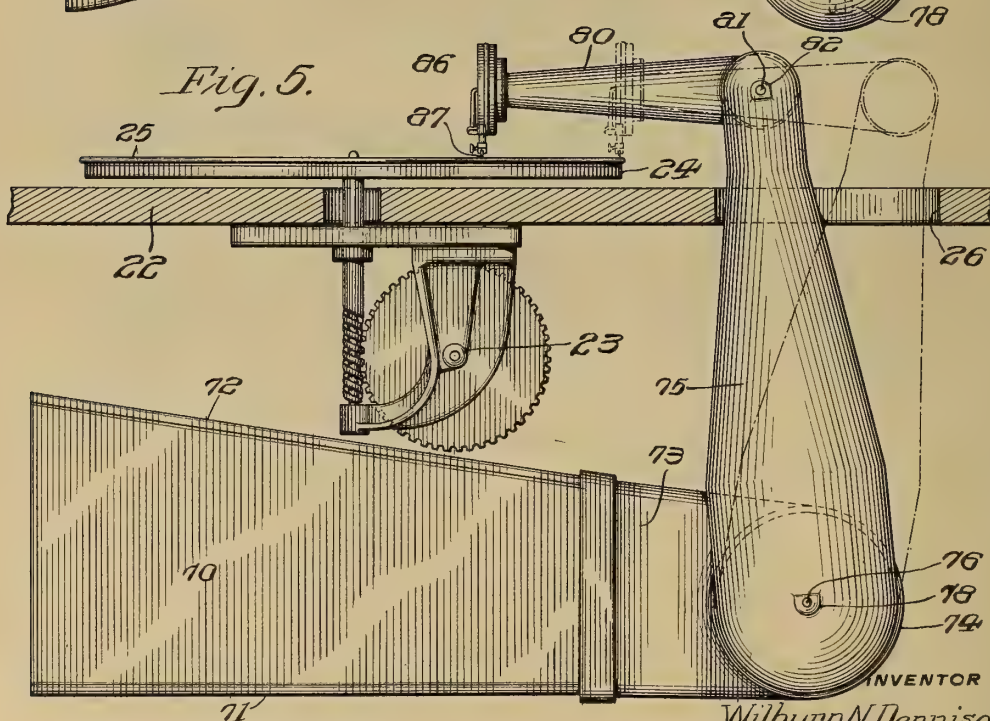
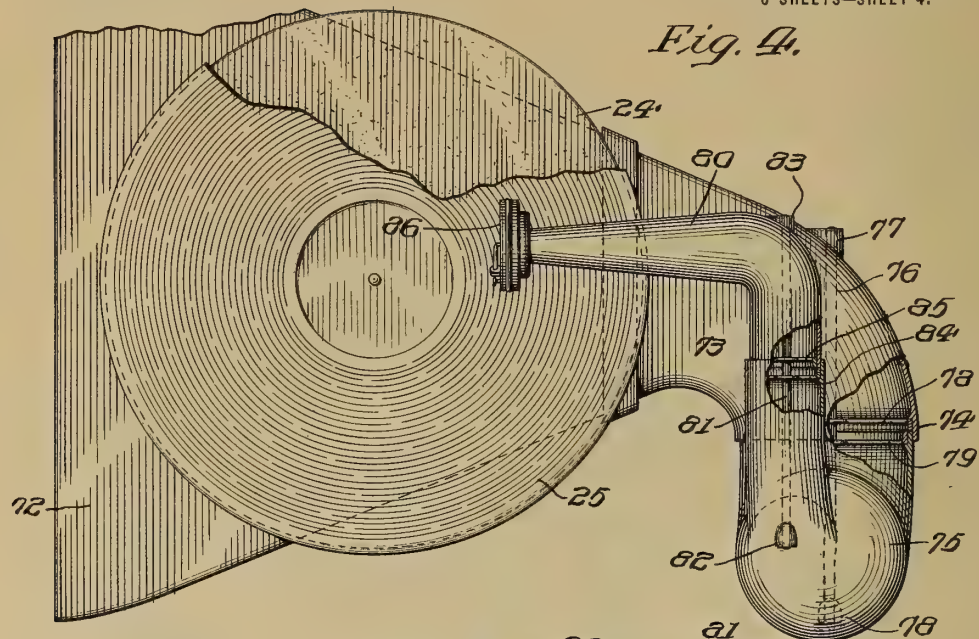




W. N. DENNISON.  
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APPLICATION FILED JULY 31, 1911.

1,152,401.

Patented Sept. 7, 1915.  
6 SHEETS—SHEET 4.



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*1 June 1915.*

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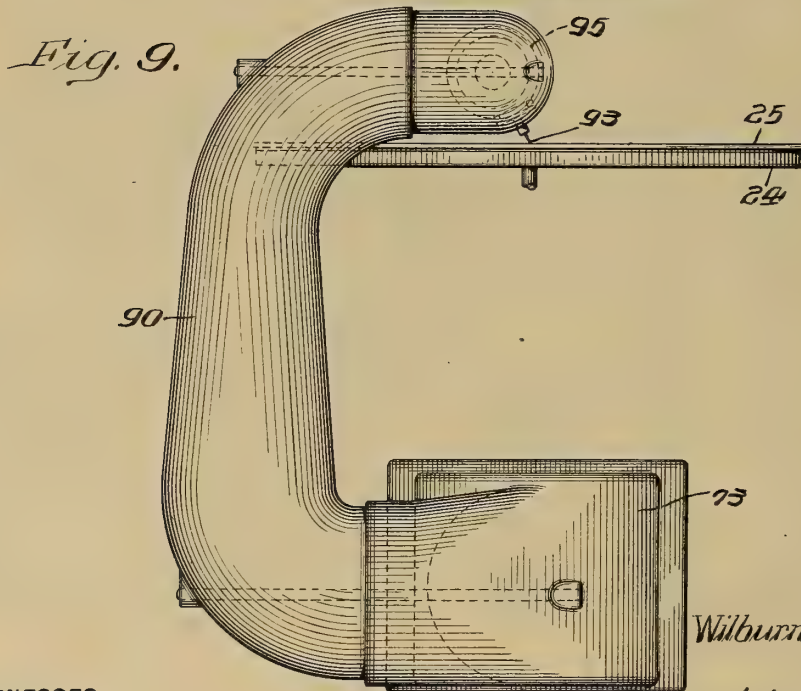
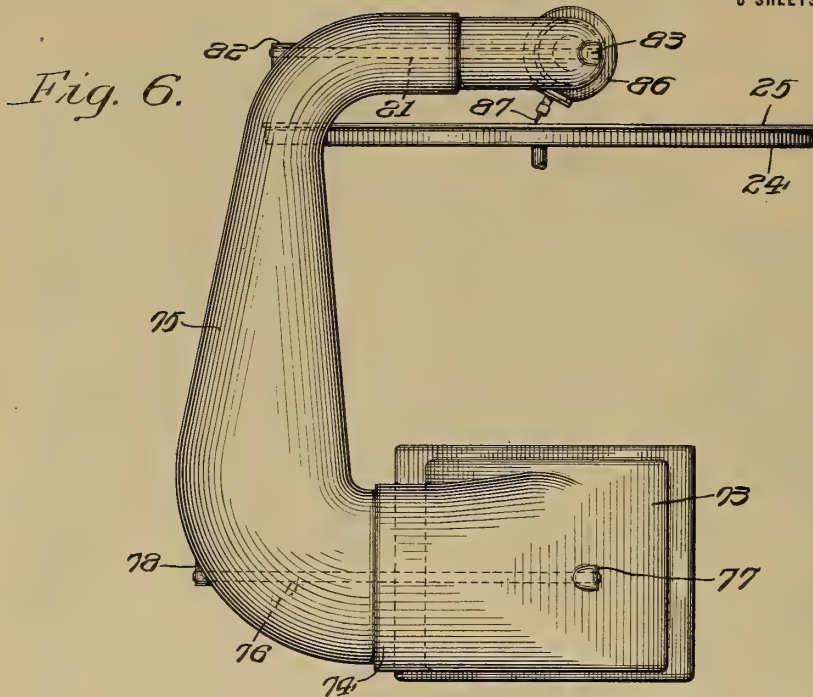


W. N. DENNISON.  
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APPLICATION FILED JULY 31, 1911.

1,152,401.

Patented Sept. 7, 1915.

6 SHEETS—SHEET 5.



WITNESSES  
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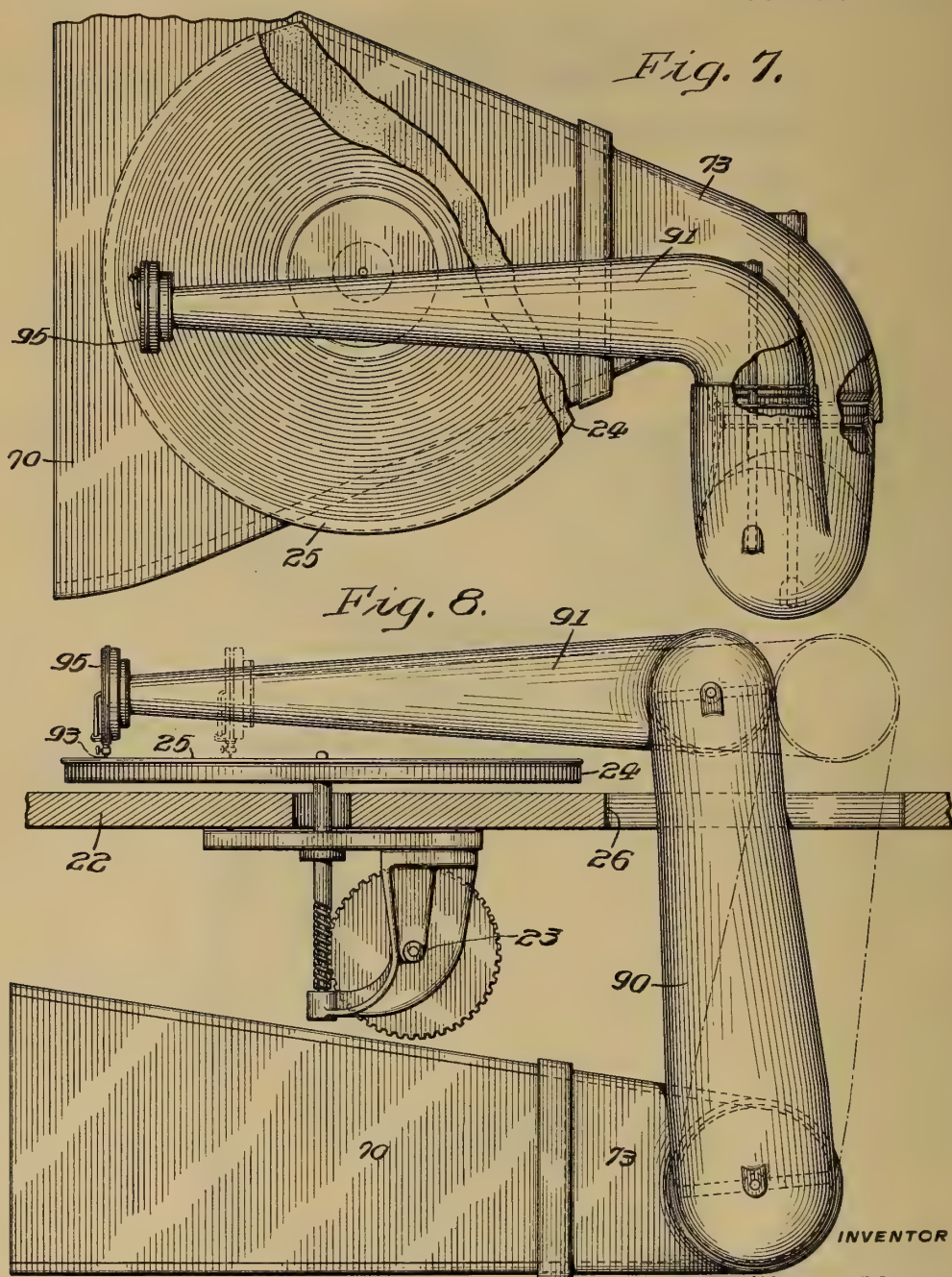
ATTORNEY



W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED JULY 31, 1911.

1,152,401.

Patented Sept. 7, 1915.  
6 SHEETS—SHEET 6.



WITNESSES  
F. J. Hartman.  
Clifton C. Halliwell

BY

INVENTOR  
Wilburn N. Dennison  
1 June 1915.  
ATTORNEY



# UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE.

1,152,401.

Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed July 31, 1911. Serial No. 641,640.

*To all whom it may concern:*

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, in the county of Camden, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

This invention relates to talking machines, and particularly to the sound transmitting or conveying mechanism for directing and delivering the sound waves generated by a sound reproducer, which is supported to be freely moved across a sound record disk by the contact of a stylus or needle with the sound reproducing line thereon, and may conveniently be applied to the well-known type of disk talking machine in which the hollow sound arm is pivoted to swing over the sound record in a plane parallel thereto.

The principal objects of this invention are, to provide a talking machine with a sound conveyer which forms a relatively long sound amplifier for the reverberation of the sound waves directed therethrough, and which is capable of inclosure by the walls of a talking machine cabinet of relatively small dimensions; to provide a sound conveyer having articulated sections telescopically connected for relative oscillation about axes which are common to the contiguous ends of adjacent sections; to provide means to effect a substantially parallel motion to the section comprising the free end of said sound conveyer, whereby the stylus is directed to traverse a rectilinear path over the sound record disk, radial to the axis of the turn-table, and whereby the longitudinal axis of the stylus is maintained in a plane which is substantially normal to the face of the sound record disk, and which is tangent to the successive convolutions of the sound producing line thereon at a point coincident with the point of the stylus; and to provide a sound conveyer with an articulated laterally extended section pivotally connecting the movable and stationary portions of the sound conveyer together.

Other objects of this invention are, to provide a sound conveyer wherein the axis of the return-bend may be disposed in close proximity to the periphery of the sound

record disk without shortening said conveyer; and to provide a sound conveyer which may support a sound reproducer in such relation to the turn-table that the stylus may coact with that portion of the sound record disk lying farthest from, or nearest to the pivotal axis of said conveyer.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

The form of this invention hereinafter described provides a talking machine of the type preferably provided with means for rotating a sound record disk, with a sound conveyer comprising an inclosed stationary sound amplifier having a laterally disposed inlet, an articulated laterally extended section forming a return-bend, which is pivotally connected, preferably in telescopic relation, with said stationary amplifier and with a horizontally extending tone arm, which carries the sound reproducer at its free end, and which is itself supported for reciprocation in a substantially rectilinear path by the articulated sections and by a link pivoted at its respectively opposite ends to the amplifier and to said tone arm, on axes parallel with the pivotal axes at the respectively opposite ends of the laterally extended section, the relative positions of said pivotal axes being such as to substantially maintain the free end of the tone arm in a plane parallel with the sound record disk.

In the accompanying drawings, Figure 1 is a plan view of an inclosed talking machine having a sound conveyer constructed in accordance with this invention, the lid or cover of the inclosing cabinet being removed for convenience of illustration; Fig. 2 is a vertical longitudinal sectional view of the cabinet shown in Fig. 1, taken on the line 2—2 in said figure, and showing the inclosed mechanism in elevation; Fig. 3 is a transverse vertical sectional view of said cabinet, taken on the line 3—3 in Fig. 1, showing the inclosed mechanism in elevation; Fig. 4 is a fragmentary plan view of a modified form of sound conveyer constructed in accordance with this invention, and having a sound reproducer in coöperative relation with a sound record disk, the telescopic connections being broken out and shown in sec-



tion, for convenience of illustration; Fig. 5 is a side elevational view of the structure shown in Fig. 4, a fragment of the cabinet being shown in section, for convenience of illustration; Fig. 6 is a rear elevation of the sound conveyer shown in Figs. 4 and 5, showing its coöperative relation with a sound record disk; Fig. 7 is a fragmentary plan view similar to Fig. 4, showing another form of sound conveyer constructed in accordance with this invention; Fig. 8 is a side elevation similar to Fig. 5, but showing the form of this invention illustrated in Fig. 7; and Fig. 9 is a rear elevation of the structure shown in Figs. 7 and 8.

Referring to the drawings, one embodiment of this invention comprises a cabinet 10 including a bottom wall 11, side walls 12, rear wall 13, front wall 14, having suitable doors 15 arranged to close the sound outlet aperture 16 therein, and a lid or cover 18 which is hinged at 19 to the upper edge 20 of the cabinet body. Extending horizontally within the cabinet walls, and slightly below the upper perimeter of said cabinet body, is a horizontally disposed partition 22, from which depends a motor 23, connected to rotate a turn-table 24 arranged above the partition 22 to carry a sound record disk 25, the partition 22 being provided with oblong apertures 26 and 27, through which the sound conveying mechanism extends as will appear hereinafter.

As best shown in Fig. 2, an amplifier 28 depends from the partition 22 and has outwardly flaring side walls 29 and 30 and a downwardly sloping bottom wall 31 embracing the motor 23. Adjacent to the rear of the amplifier 28, and disposed transversely within the cabinet, below the horizontal partition, is a vertically extending partition 33, which supports a rearwardly extending stationary amplifier section 35, whose walls converge rearwardly at substantially the same angle as the walls of the amplifier 28, and merge into a laterally extending cylindrical portion 36, forming a circular opening in which is fitted a spider-frame 37. Projecting laterally and extending upwardly from the cylindrical portion 36 or smaller end of the amplifier section 35, and communicating therewith, is a movable tubular section or support 39, which is substantially U-shaped, as best shown in Fig. 3, and has a lower horizontal cylindrical end 40 fitted in telescopic relation within the cylindrical portion or end 36 of the stationary amplifier section 35, and is provided with a spider-frame 41 disposed therein adjacent to the end thereof. This movable tubular section 39 is connected in oscillatory relation with the stationary amplifier section 35 by a horizontal rod or shaft 42, which is mounted in suitable bearing bosses 43 and 44, projecting exterior to the respective sections 35

and 39, and which extends through both of the spiders 37 and 41 in said respective sections, whereby the free relative oscillation of said sections is effected upon a common axis. This movable tubular section 39 tapers upwardly from its lower end and terminates in a transversely extending substantially cylindrical upper end 45 in which is fitted a spider-frame 46, this upper end being spaced slightly above the plane of the disk record 25. Spaced above the turn-table 24 is a substantially horizontal tapering tone arm 50, the major portion of which is preferably substantially straight and arranged longitudinally within the cabinet 10, and the larger end of which is curved longitudinally through an arc of 90 degrees and terminates in a horizontal cylindrical portion which telescopes loosely in the upper cylindrical end of the tubular support 39. A spider-frame 51 is disposed within the cylindrical portion of the larger end of the tone arm 50. The larger end of the tone arm 50 and the upper end of the tubular section 39 are pivotally connected by a horizontal rod or shaft 53, which extends through the spider 46 and 51 and which is mounted in suitable bearing bosses 54 and 55 provided therefor exteriorly on the tone arm 50 and on the tubular support 39, whereby these members are connected to oscillate with respect to each other about a common horizontal axis coinciding with the longitudinal axis of the rod 53.

The tone arm 50 is maintained in a substantially horizontal plane by a link 57, which, as best shown in Figs. 2 and 3, is pivotally connected at its respectively opposite ends with a boss 58 on the amplifier section 35 by a stud 59, and with a bifurcated lug 60 on the tone arm 50 by a pintle 61. The link 57 may be disposed in substantially parallel relation to a plane coinciding with the axes of the shafts 42 and 53, so as to maintain the tone arm 50 in parallel relation to the plane of the turn-table 24, but it has been found by experiment that the location of the pivotal axes of the link 57 may be varied as desired so long as the outer free end of the section 50 is maintained in a plane parallel to the plane of the turn-table 24 in any position of reciprocation of said section. The free end of the section 50 may be conveniently provided with the transversely extending cylindrical barrel 63, into which is telescopically fitted for oscillation, an outwardly curved tubular neck 64, having its outer free end arranged to receive a sound reproducer 65, which is maintained thereby in such position that the point of the stylus 66 carried by the reproducer 65 is directed in a rectilinear path, radially with respect to the axis of the turn-table 24, and the longitudinal axis of the stylus is maintained in oblique relationship and at a



substantially constant angle with respect to the plane of the turn-table and in a plane substantially perpendicular to the plane of said turn-table, and progressively tangential  
 5 with respect to the successive convolutions of the sound line of a sound record disk carried thereby.

It is to be noted that in the sound conveyer above described, the U-shaped return-bend  
 10 or section 39 may be disposed in close proximity to the periphery of the turn-table 24, whereby the cabinet may be comparatively short, and in view of the fact that the tone arm 50 extends across the turn-table, and the  
 15 stylus needle 66 coöperates with the sound record disk, at the region of the disk most remote from the pivotal axis of the tone arm 50, the structure affords, within a relatively small space, a relatively long sound  
 20 conveyer for the reverberation and amplification of the sound waves directed there-through.

In the form of this invention shown in Figs. 4, 5 and 6, the sound amplifier 70 is  
 25 supported independently of the partition 22, preferably by attachment to the inclosing cabinet (not shown), and is disposed below the motor 23, having its lower wall 71 substantially parallel with the partition 22 and  
 30 its upper wall 72 extending below the motor and obliquely upwardly toward the delivery end of the amplifier.

In the latter form of this invention the amplifier 70 is attached to its rearwardly  
 35 extended section 73, whose walls adjacent to said amplifier are disposed in alinement therewith, and merge into a laterally extended cylindrical portion 74, forming the inlet orifice for said amplifier. Also, in this  
 40 latter form, the movable tubular section or support 75 is similar to the movable tubular support 39, shown in Figs. 1, 2 and 3, but is of greater length, owing to the distance of the amplifier 70 from the partition 22.  
 45 Said section 75 is connected to oscillate with respect to the section 73 of the amplifier by a horizontal rod or shaft 76, which is mounted in suitable bearing bosses 77 and 78 on the  
 50 respective sections 73 and 75, and which extends through suitable spiders 78 and 79 disposed in said respective sections, adjacent to their opposed ends.

Extending horizontally from the upper end of the movable tubular section 75, is a  
 55 tone arm 80 which is pivotally connected to the upper end of the section 75, preferably in telescopic relation, by a horizontal rod or shaft 81, which is mounted in bearing  
 60 bosses 82 and 83 on the section 75 and tone arm 80 respectively, and which extends through suitable spiders 84 and 85 disposed in said section and said tone arm respectively, thereby connecting said sections for  
 65 relative oscillation about a common horizontal axis. Mounted directly upon the

free end of this tone arm 80 is a sound reproducer 86 which is maintained by the tone arm 80 in such relation to the sound record disk 25, that the point of its stylus  
 70 needle 87 is directed in a rectilinear path co-incident with the radius of said record disk, which is perpendicular to a vertical plane coincident with the fixed axis of oscillation of said section 75, the length of the tone arm  
 75 80 being such that the point of the stylus needle 87 is coöperative with the lines of the record disk 25, which lie between the axis of rotation of the record disk and a vertical plane coincident with the fixed axis of oscillation of the tubular support 75. It  
 80 will be noted that by this construction, the parallel arrangement for supporting the free end of the horizontal tone arm, comprising the link 57, boss 58, stud 59, lug 60 and pintle 61, as shown in Figs. 1 and 2,  
 85 may be omitted; the sound reproducer being directly attached to the free end of the tone arm 80. By this arrangement, however, it may be observed that, owing to the fact that the axis of the shaft or rod 81 travels in an  
 90 arc whose center is the axis of the rod or shaft 76, the distance of the pivotal axis of the tone arm 80 from the plane of the turn-table will vary slightly as the tubular support 75 is oscillated, whereby a slight deviation  
 95 of the plane of the stylus needle with respect to the sound record disk must necessarily occur, which deviation depends in degree upon the distance between the axes of the rods 76 and 81.  
 100

In the construction shown in Figs. 4, 5, and 6, the deviation of the plane of the needle with respect to the sound record disk 25 may be reduced by prolonging the tone arm to such an extent as to permit the stylus  
 105 needle to coöperate with the sound lines of the disk 25 which are most remote from the vertical plane which coincides with the axis of oscillation of said arm. Such a construction is shown in Figs. 7, 8 and 9, wherein  
 110 the movable tubular section 90 is pivotally connected to the stationary section 73 of the amplifier in the same manner as the movable tubular section 75 is connected to the stationary section 73 of the amplifier in Figs.  
 115 4, 5, and 6, and the tone arm 91 is pivotally connected to the upper end of the movable tubular section 90 in the same manner as the tone arm 80 is connected to the upper end of the movable tubular section 75 in Figs. 4, 5,  
 120 and 6. The tone arm 91 extends across the turn-table 24 to such an extent as to permit the point of the stylus 93 of the sound reproducer 95, carried by the tone arm, to coöperate with the sound lines of the sound  
 125 record disk 25 which are most remote from the vertical plane which coincides with the fixed axis of oscillation of the movable tubular section 90.

In many talking machines in general use 130



the tone arm is pivoted to swing about a vertical axis and carries at its free end a sound reproducer the stylus of which is caused to swing over the sound record disk in a path coincident with the arc of a circle, the center of which coincides with the pivotal axis of said tone arm, whereby a plane normal to the tablet and coincident with the longitudinal axis of the stylus may possibly not coincide with planes passing through said pivotal axis of said tone arm and tangent to the convolutions of the sound reproducing groove on said record disk.

It has been found by experiment that it may be advantageous to direct the stylus in a rectilinear path radial to the axis of the turn-table, whereby the plane coincident with the longitudinal axis of the stylus and normal to the surface of the record disk is maintained in substantially constant tangential relation to the successive convolutions of the sound lines on the sound record disk.

In disk talking machines wherein the tone arm swings about a vertical axis, the stylus coöperates with the sound record disk on one side of a plane coincident with the axis of oscillation of said tone arm and the axis of rotation of the turn-table, and that in order to afford sufficient length of tone arm to be effective to obtain the best results from the sound waves directed therethrough, and to make the path of the stylus an arc of relatively large radius the axis of the tone arm is located at a considerable distance from the axis of the turn-table, whereby a relatively large cabinet must be provided to inclose such structure, whereas the forms of the invention herein shown and described provide a comparatively long sound conveyer which may be inclosed in a comparatively small cabinet.

It is evident that this invention is not limited to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the features of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A sound conveyer for talking machines, comprising a sound amplifier, a tone arm, and a tubular section comprising a return bend mounted to oscillate on a horizontal axis, said section having its opposite ends respectively fitted in pivotal relation with said tone arm and with said amplifier.

2. A sound conveyer for talking machines, comprising a sound amplifier, a tone arm movable in substantially the direction of its axis, and a tubular section comprising a return bend connected to said tone arm and to said amplifier and lying at all times in a plane perpendicular to a vertical plane

coincident with the longitudinal axis of said tone arm.

3. A sound conveyer for talking machines comprising a sound amplifier, a tone arm, and a movable laterally extending tapered tubular section connected to said tone arm and comprising a return bend, said return bend being directly connected to said amplifier to oscillate with respect thereto on a horizontal axis.

4. A sound conveyer for talking machines, comprising a sound amplifier having a laterally disposed inlet, a laterally extending tubular section comprising a return bend pivotally connected to communicate with said inlet, and a tone arm movably connected to said return bend and communicating therewith.

5. A sound conveyer for talking machines, comprising a sound amplifier having a laterally disposed cylindrical inlet, a laterally extending tubular section comprising a return bend provided with a cylindrical end pivotally fitted for relative oscillation in said inlet, and a tone arm movably connected to said section and communicating therewith.

6. A sound conveyer for talking machines, comprising a sound amplifier having a laterally disposed inlet, a tone arm, and a laterally extending U-shaped section connected to said tone arm and pivotally connected with said amplifier.

7. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a movable tubular section comprising a laterally disposed return bend, a pivot connecting said tone arm to said section, a pivot parallel to said first mentioned pivot and upon which said section is mounted to oscillate with respect to said amplifier, and means acting in a direction at all times substantially parallel with a plane coincident with the axes of said pivots and pivotally supporting said tone arm in a substantially horizontal plane.

8. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a tubular section providing a laterally disposed return-bend connected to said tone arm and connected for oscillation relative to said amplifier, and means operative to direct the free end of said tone arm in a rectilinear path.

9. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a tubular section providing a laterally disposed return-bend connected to said tone arm and connected for oscillation relative to said amplifier, and means operative to support said tone arm and to direct it in a substantially rectilinear path.

10. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a tubular section providing a laterally dis-



posed return-bend connected to said tone arm and connected for oscillation relative to said amplifier, and means operative to support said tone arm in a substantially horizontal position, and to direct its free end in a substantially rectilinear path.

11. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a tubular section providing a laterally disposed return-bend connected to said tone arm and connected with said amplifier for relative oscillation, and substantially parallel motion means operative to support said tone arm for horizontal reciprocation, and to direct its free end in a substantially rectilinear path.

12. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a tubular section providing a laterally disposed return-bend connected with said tone arm and with said amplifier, for relative oscillation, means operative to support said tone arm in horizontal position, and effective to direct the free end of said arm in a rectilinear path, and a pivoted connection carried by the free end of said arm, for carrying a sound reproducer.

13. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a tubular section extended laterally, and forming a return-bend pivotally connected to said tone arm and said amplifier upon horizontal axes, and a link supporting said tone arm for horizontal reciprocation.

14. A sound conveyer for talking machines, comprising an amplifier, a tone arm, a laterally extended tubular section operative to oscillate with respect to said tone arm and with respect to said amplifier, and connected in telescopic relation with said tone arm and with said amplifier, a link supporting said tone arm horizontally, and operative to direct its free end in a substantially rectilinear path, and a laterally extending connection carried by the free end of said tone arm and arranged to support a sound reproducer.

15. A sound conveyer for talking machines, comprising an amplifier having a laterally extended cylindrical inlet, a tone arm having a laterally disposed cylindrical outlet, a tubular return bend having its opposite ends telescopically engaged in pivotal relation with said outlet and with said inlet respectively, and a sound reproducer carried by said tone arm and operative to direct the point of a stylus carried thereby in a rectilinear path.

16. In a talking machine, the combination with a cabinet, of a turn-table rotatable therein, and arranged to support a sound record disk, an amplifier disposed beneath said turn-table, a tone arm disposed above said turn-table, and a tubular section extended laterally, and forming a return-bend pivot-

ally connecting said tone arm and said amplifier adjacent to the edge of said turn-table, the free end of said tone arm extending beyond the axis of said turn-table, and arranged to carry a sound reproducer, and to direct its stylus in a rectilinear path substantially radial to said turn-table, and to substantially maintain the plane of said stylus in normal relation to the sound record disk, and tangent to the successive convolutions of the sound lines on said disk.

17. In a talking machine, the combination with a cabinet, of a turn-table arranged to rotate therein, operative to carry a sound record disk, a sound amplifier, a tone arm having a section connected to said tone arm and projecting laterally and forming a return-bend pivotally connected with said amplifier on a horizontal axis, and a sound reproducer carried by the free end of said tone arm, and having its stylus directed in a rectilinear path, substantially coincident with a radius of said turn-table, said tone arm extending beyond the axis of said turn-table and operative to direct the stylus over that portion of the sound record disk which is most remote from the pivotal connection of said tone arm.

18. In a talking machine, the combination of an amplifier, a tone arm, and a tubular member uniting said amplifier and said tone arm and having swivel connections therewith, said swivel connections having parallel axes and said tubular member being free to turn on said axes to cause a substantially rectilinear movement of said tone arm.

19. In a talking machine, the combination of an amplifier, a tone arm, and a tubular member uniting said amplifier and tone arm and having telescopic connections therewith, said telescopic connections having parallel axes and said tubular member being free to turn on said axes to cause a substantially rectilinear movement of said tone arm.

20. A sound conveyer for talking machines, comprising an amplifier having an opening, a tone arm having a laterally disposed opening, and a unitary tubular member having a return bend with its opposite ends telescopically engaged in pivotal relation with the opening in said amplifier and tone arm respectively.

21. The combination of a hollow sound conveyer, a hollow amplifier, and a tubular section provided at its ends with openings coöperative respectively with said conveyer and said amplifier, said section being fitted to turn with respect to said conveyer about an axis coincident with the axis of one of said openings, said section being also fitted to turn with respect to said amplifier about an axis coincident with the axis of the other of said openings.

22. The combination of a hollow sound conveyer, a hollow amplifier, and a tubular

section provided at its ends with openings cooperating respectively with said conveyer and said amplifier, said section being fitted to turn with respect to said conveyer about an axis coincident with the axis of one of said openings, said section being also fitted to turn with respect to said amplifier about an axis parallel with the said first-men-

tioned axis and coincident with the axis of the other of said openings.

10

In witness whereof, I have hereunto set my hand this 27th day of July, A. D., 1911.

WILBURN N. DENNISON.

Witnesses:

FRANK B. MIDDLETON, Jr.,

CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



EJECTOR OR THROW-OFF FOR SOUND RECORDS,  
#1,152,529-----T. H. Macdonald,  
Patented- Sept. 7, 1915.  
Filed-Dec. 17, 1908.

1,152,529.

2 SHEETS—SHEET 1.



Thomas H. Macdonald, Inventor  
By his Attorneys  
Mauro, Cameron & Lewis





T. H. MACDONALD.  
EJECTOR OR THROW-OFF FOR SOUND RECORDS.  
APPLICATION FILED DEC. 17, 1908.

1,152,529.

Patented Sept. 7, 1915.

2 SHEETS—SHEET 2.

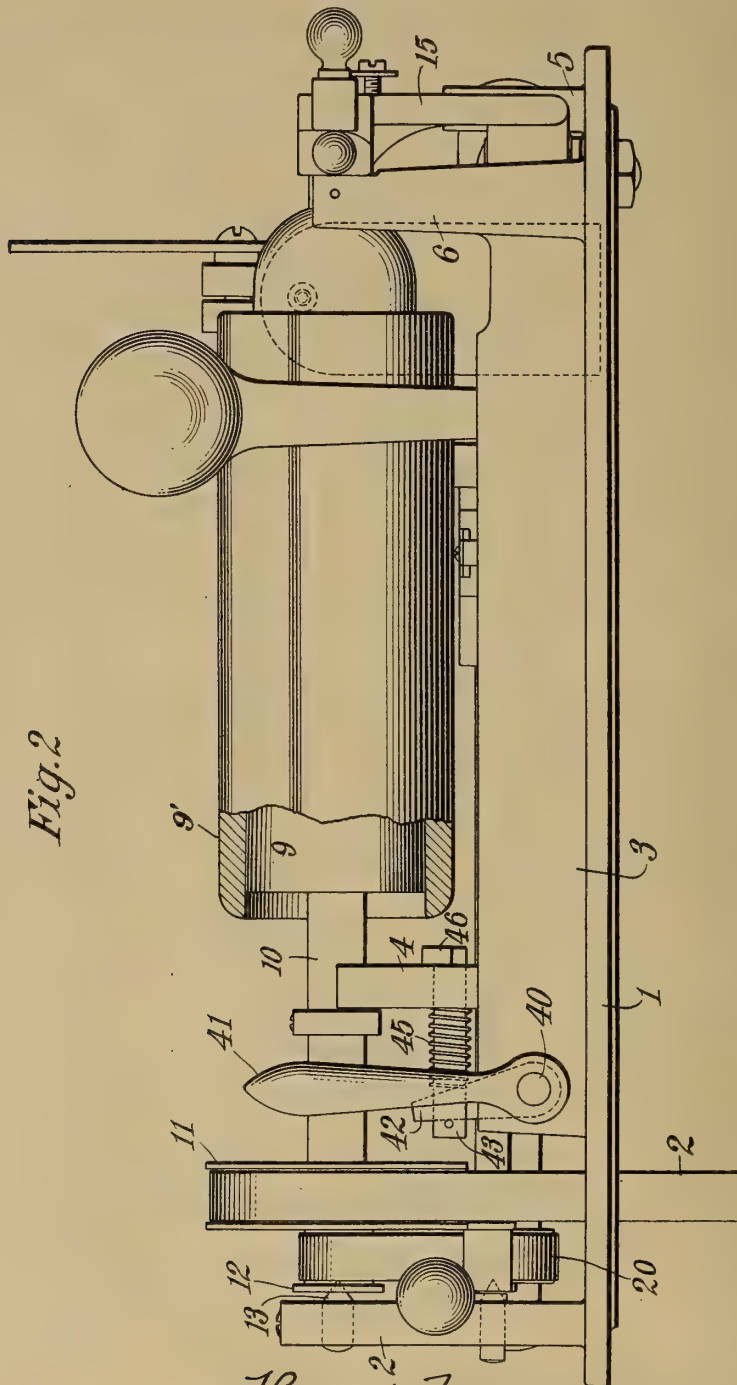


Fig. 2

Witnesses:  
M. A. Hood.  
R. C. Fitzhugh.

Thomas H. Macdonald, Inventor  
By his Attorneys  
Mauro, Cameron Lewis & Massie

# UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## EJECTOR OR THROW-OFF FOR SOUND-RECORDS.

1,152,529.

Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed December 17, 1908. Serial No. 468,007.

*To all whom it may concern:*

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Ejectors or Throw-Offs for Sound-Records, which is fully set forth in the following specification.

The present invention relates to talking-machines in which a cylindrical record is carried by a mandrel, and the particular object of the invention is to provide an improved ejector for imparting to the tablet an initial movement to disengage the same from the mandrel and project it beyond the end of the mandrel, in order that the fingers of the operator may be introduced into the end of the cylindrical tablet. By this means the tablet may be readily removed without injury which might result if the outside of the record was handled.

The invention will be better understood by reference to the accompanying drawings, illustrating one expression of the inventive idea, and wherein—

Figure 1 is a plan view, partly in section, of a preferred embodiment of my invention; and Fig. 2 is a front elevation of the same, partly broken away.

Referring to the drawings, wherein like reference numerals indicate like parts, 1 is the bed-plate, from which rises the end plate 2, front rail 3, and standards 4, 5, 6, 7, and 8. 9 is the ordinary revoluble tapered mandrel which carries the cylindrical sound record 9'. The mandrel 9 is mounted on a shaft 10 which rests in a journal seat in standard 4 and carries the belt-pulley 11 and a smaller belt-pulley 12. An adjustable cone-bearing 13, mounted in the end plate 2, supports one end of this shaft. The other end of this shaft is preferably held by another adjustable cone-bearing 14 provided in the swinging gate 15, which latter has a comparatively long journal-bearing upon the standard 5. This gate 15 is latched at 16 to standard 6 in any desired manner. To the rear of shaft 10, and parallel therewith, is a feed screw 17 which is supported in adjustable conical bearings that are mounted in end plate 2 and standard 7, respectively; and a belt-pulley 18 is carried by the feed screw 17 in line with the smaller pulley 12

on the mandrel shaft 10. A rear guide rail 19 is secured between end plate 2 and standard 8. The belt-pulley 11 on the mandrel shaft is driven at a high rate of speed by belt from the motor, in the usual manner; and the belt 20 from smaller pulley 12 drives pulley 18 and feed screw 17.

A carriage 21 slides on the back guide 19, being mounted thereon in any convenient manner, and this carriage carries a flat spring 22 at the forward end of which is a partial nut 23, which nut meshes with the feed screw 17. A bridge-piece 24 projects from the carriage over the mandrel and rests in front of the same upon the forward guide 3.

Between the mandrel and its pulley, and beneath the mandrel shaft, is journaled a transverse rock-shaft 40 which is provided with a handle 41 and an upwardly projecting arm 42. This arm 42 bears against a longitudinally sliding bar 43 mounted in suitable bearings one of which may be standard 4, preferably beneath and parallel with the mandrel shaft. A spring 45 encircles the bar 43 and tends to force said bar to the left, away from the mandrel. Secured to said sliding bar in any suitable manner is a plate 46, preferably crescent shape, which plate lies opposite the annular inner end of the record cylinder or tablet upon the mandrel. By swinging handle 41 of the rock-shaft toward the right, spring 45 is compressed and plate 46 is forced to the right, engaging the cylinder and moving the same longitudinally of the mandrel. When the handle 41 is released, the spring 45 restores the parts to their initial position. It will be understood that before the record cylinder or tablet is removed, the motor is stopped (or its shaft thrown out of gear), the end gate 15 is thrown open, and the handle 41 is then moved toward the right into engagement with the record tablet. The movement imparted to the record tablet by the mechanism described projects said tablet beyond the end of the mandrel a sufficient distance so that the fingers of the operator may be readily inserted in said projecting end, and the record removed from the mandrel without danger of injury to the surface of the same.

While the invention has been illustrated in association with a machine for shaving



sound records, it will be understood that it may be employed in connection with any form or type of machine on which cylindrical records are used; and while, for the purpose of clearness, one expression of the inventive idea has been described in considerable detail, it is to be understood that the invention is not limited to the structure shown but that the inventive idea is capable of various expressions within the limits of the appended claims.

What is claimed is:

1. In combination, a revolving mandrel, a record cylinder mounted thereon, a throw-off for said cylinder comprising a transverse rock-shaft having a handle, a longitudinally-sliding bar connected to and actuated by said rock-shaft, and ejecting means for said cylinder carried by the end of the longitudinal bar in juxtaposition to the end of the cylinder.

2. In combination, a revolving mandrel, a record cylinder mounted thereon, a throw-off for said cylinder comprising a transverse rock-shaft having a handle, a longitudinally-sliding bar actuated by said rock-shaft, a plate carried by the end of the longitudinal bar in juxtaposition to the end of the cylinder, and means for holding said

plate normally out of contact with the cylinder.

3. In combination, a revolving mandrel adapted to receive a cylinder, of a throw-off therefor comprising a transverse rock-shaft having a handle, a longitudinally-sliding shaft actuated by said rock-shaft, a plate carried by the end of the longitudinal shaft in juxtaposition to the end of the cylinder, and means for holding said plate normally out of contact with the cylinder.

4. In combination, a revolving mandrel, a record cylinder mounted thereon, a throw-off for said cylinder comprising a transverse rock-shaft having a handle, a longitudinally-sliding bar, an arm mounted on said rock-shaft and engaging said bar, a plate carried by the end of the longitudinal bar in juxtaposition to the end of the cylinder, and a spring for holding said plate normally out of contact with the cylinder.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

M. R. PARDOE,  
C. W. HEDBERG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



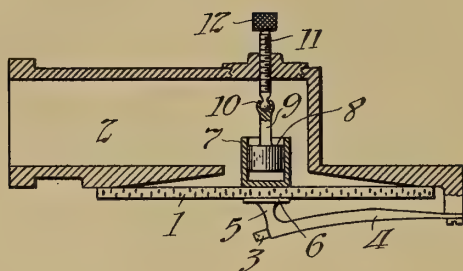
PHONOGRAPHIC RECORDING APPARATUS,  
# 1,152,614-----T. A. Edison,  
Patented-September 7th, 1915.  
Filed-Jan. 27, 1910.

T. A. EDISON.  
PHONOGRAPHIC RECORDING APPARATUS.  
APPLICATION FILED JAN. 27, 1910.

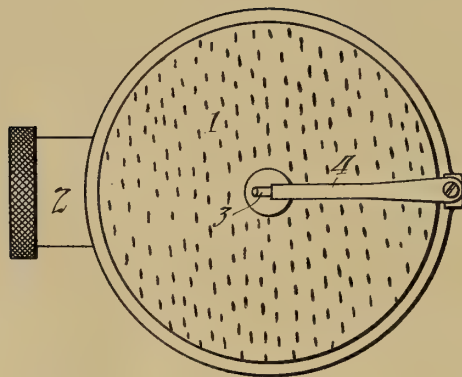
1,152,614.

Patented Sept. 7, 1915.  
2 SHEETS—SHEET 1.

*Fig. 1*



*Fig. 2*



*Witnesses:*  
*Frank D. Lewis*  
*Dyer Smith*

*Inventor:*  
*Thomas A. Edison*  
*by Frank T. Dyer*  
*His Atty.*





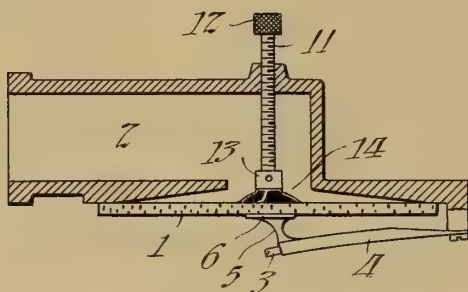
T. A. EDISON.  
PHONOGRAPHIC RECORDING APPARATUS.  
APPLICATION FILED JAN. 27, 1910.

1,152,614.

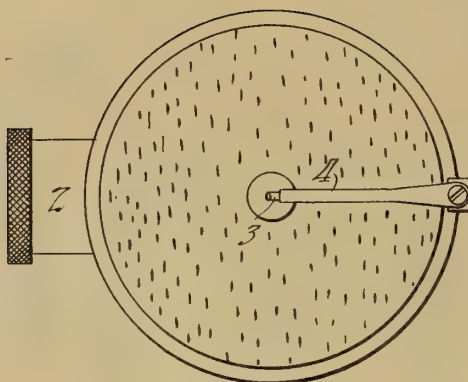
Patented Sept. 7, 1915.

2 SHEETS—SHEET 2.

*Fig. 3*



*Fig. 4*



*Witnesses:*  
Frank Lewis  
Dyer Smith

*Inventor:*  
Thomas A. Edison  
By Frank W. Ayer  
his Atty.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR TO  
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION  
OF NEW JERSEY.

## PHONOGRAPHIC RECORDING APPARATUS.

1,152,614.

Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed January 27, 1910. Serial No. 540,317.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, county of Essex, and State of New Jersey, have made a certain new and useful Invention in Phonographic Recording Apparatus, of which the following is a description.

My invention relates to phonographic recording apparatus, and my object is to provide a recording apparatus which is extremely sensitive to vibrations of small amplitude, but which is relatively insensitive to vibrations of large amplitude. Heretofore, recording devices which have been sufficiently sensitive to record vibrations of small amplitude, have permitted the diaphragm to move excessively when recording vibrations of relatively great amplitude. On the other hand, diaphragms which are sufficiently stiff and sensitive to permit practicable recording of vibrations of great amplitude have been practically unresponsive to the very small vibrations which often give character and quality to music.

As it is necessary to keep the maximum movement of the diaphragm within certain limits, my invention provides an extremely sensitive diaphragm, preferably of cork, which shall be readily responsive even to excessively weak vibrations, and I employ in cooperation therewith a braking or retarding device having the peculiarity of imposing resistance to the diaphragm only when it tends to vibrate to an undue extent, so as to thereby dampen and control its movements under the effect of sound vibrations of great amplitude. The advantages of a cork diaphragm are pointed out in my application Serial No. 526,036, filed Nov. 3, 1909. The braking or retarding means referred to are positioned preferably on the side of the diaphragm distant from the stylus. I will describe herein two suggested arrangements, either of which is adapted to perform the function described.

In order that the invention may be better understood, attention is hereby directed to the accompanying drawings, forming part of this specification, and in which I illustrate two forms of apparatus embodying my invention.

Figure 1 represents a vertical cross sec-

tional view of one form of apparatus embodying my invention. Fig. 2 represents a bottom plan view thereof. Fig. 3 represents a vertical cross sectional view of a second form of apparatus embodying my invention, and Fig. 4 represents a bottom plan view thereof.

Referring to the drawings, the diaphragm 1 of cork or other desired material is secured in any desired manner to the sound box 2. The recording stylus 3 is carried by the arm 4 which may be secured to the flange of sound box 2, as shown in the drawings, or otherwise suitably mounted, the foot 5 integral with or secured to arm 4 being cemented or otherwise secured to the center of the under side of the diaphragm as indicated at 6.

Referring to the form of my apparatus shown in Figs. 1 and 2, a small cylinder 7 is secured axially to the upper side of the diaphragm 1 and the plunger 8 is positioned within the cylinder. This plunger is secured to the sound box 2 in any desired manner, so that the air confined within the cylinder below the plunger is compressed by upward movement of the diaphragm to prevent excessive movement of the latter. As shown in the drawings, the plunger is provided with an upper portion 9 of reduced diameter, which is connected by a ball and socket joint 10 with an adjusting screw 11, which is threaded within the wall of sound box 2, as shown. By making use of a ball and socket joint as described, the danger of the plunger cramping within the cylinder 7 is overcome, and a smooth relative movement of the two elements is permitted at all times. The portion of the wall of sound box 2 in which screw 11 is threaded, may itself be removably secured, as by a screw engagement within a threaded opening in the wall of the sound box, as shown in the drawings, for convenience in adjusting the parts. The position of plunger 8 within cylinder 7 may be adjusted by rotating screw 11 in either direction by means of knurled head 12, whereby the amount of compression obtained between the bottom of plunger 8 and the upper side of diaphragm 1 on the upward movement of the diaphragm may be varied. It will, of course, be obvious that, if desired, the positions of cylinder 7 and



plunger 8 might be reversed, the plunger being secured to the diaphragm, and the cylinder to the sound box.

Referring to the form of my invention shown in Figs. 3 and 4, the screw 11 is threaded within the wall of sound box 2 in the same manner as in the first species of my invention, but the lower end of this screw is provided with a head 13 having a flat lower surface which is adjusted to a position only a short distance above the upper side of diaphragm 1. A sticky viscous material 14 is placed upon the center of the upper side of diaphragm 1 before screw 11 is adjusted, so that it forms a yielding connection between the diaphragm and the lower surface of head 13. This sticky material is too viscous to flow to any extent, and acts practically in the same manner as the air cushion described in connection with Figs. 1 and 2. In either case the compression of the air or the distortion of the viscous material imposes substantially no resistance to movements of the diaphragm caused by very weak vibrations; whereas, in the case of sound vibrations of great magnitude, the movements of the diaphragm are damped and kept within practicable limits.

Both forms of cushioning means herein disclosed are substantially incapable of being set into continued vibration by the elasticity thereof and therefore offer no objectionable interference to the true vibration of the diaphragm.

It is to be understood that I am not limited to the exact details of construction shown in the drawings, but that my invention is as broad as the appended claims.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a device of the class described, the combination of a sound box, a diaphragm mounted therein, a stylus in operative relation to said diaphragm, and means bearing on said diaphragm and comprising an air chamber for imposing a resistance to the vibrations of the diaphragm, substantially as described.

2. In a device of the class described, the combination of a sound box, a diaphragm mounted therein, a stylus in operative relation to said diaphragm, and means for imposing resistance to the vibrations of the

diaphragm, comprising an air chamber and a plunger fitting therein, one of said parts bearing on said diaphragm, said air chamber and plunger being manually adjustable relatively to each other for varying the resistance to the movement of the diaphragm, substantially as described.

3. In phonographic sound recording apparatus, in combination, a sound box, a diaphragm secured thereto, a stylus connected therewith, and a device for imposing a resistance to the vibrations of the diaphragm of considerable amplitude, comprising a cylinder and a plunger closely fitting therein, said parts being relatively movable, and one of said parts bearing on and moving with said diaphragm, substantially as described.

4. In phonographic sound recording apparatus, in combination, a sound box, a diaphragm secured thereto, a stylus connected therewith, a cylinder and a plunger closely fitting therein, one of said parts being secured to said diaphragm and the other of said parts being secured to said sound box, and supporting means for one of said parts constructed to prevent binding between said cylinder and plunger in their relative movement, substantially as described.

5. In phonographic sound recording apparatus, in combination, a sound box, a diaphragm secured thereto, a stylus connected therewith, a cylinder secured axially to said diaphragm, a plunger fitting closely therein, an adjustable member secured in said sound box axially in line with said plunger, and a ball and socket connection between said member and said plunger, substantially as described.

6. In phonographic sound recording apparatus, in combination, a sound box, a diaphragm secured thereto, a stylus connected with said diaphragm, means for imposing a resistance to the vibration of the diaphragm comprising a cylinder and a plunger closely fitting therein, and means for manually adjusting the normal positions of said cylinder and plunger axially of each other, substantially as described.

This specification signed and witnessed this 26th day of January 1910.

THOS. A. EDISON.

Witnesses:

DYER SMITH,  
JOHN M. CANFIELD.



# UNITED STATES PATENT OFFICE.

MERVIN E. LYLE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## PROCESS OF PRESSING SOUND-RECORDS.

1,152,651.

Specification of Letters Patent.

Patented Sept. 7, 1915.

No Drawing.

Application filed July 15, 1913. Serial No. 779,174.

*To all whom it may concern:*

Be it known that I, MERVIN E. LYLE, of Bridgeport, Connecticut, have invented a new and useful Improvement in Processes of Pressing Sound-Records, which invention is fully set forth in the following specification.

This invention relates to a process of pressing sound records by the use of a suitable matrix. It has heretofore been proposed to make said records by placing a body of thermoplastic material, softened by heat, in contact with a heated matrix in a suitable die, and while both the matrix and the material are heated subject the same to pressure and then cool the matrix and record material while still under pressure and finally separate the pressed record from the matrix. In such process, the thermoplastic record material has been placed in contact with the matrix in the form of a lump at approximately the central portion of the matrix and then subjected to pressure. It has also been proposed to form the record proper with a body portion of inferior record material and a thin face portion of superior record material in the form of a thin film or layer on the surface of a separating sheet of material such as paper. In making this last record, the process consists in heating the matrix and the superior record material carried by the separating sheet; placing the superior record material face downward on the matrix and then placing the inferior record material in a heated condition, either in the form of a lump or in disk form, and then subjecting the whole to pressure while heated and allowing the pressed record and the matrix to cool under pressure. This last mentioned method has certain advantages, but it has been found that there is a decided disadvantage due to the fact that the sheet of paper remains in the record interposed as a dividing sheet between the superior record material and the inferior body portion of the record, which sheet of paper is liable to wrinkle or blister and form a defective spot or portion in the record.

A still further process of pressing sound records consists in forming a disk of inferior thermoplastic material as a body portion of the record and sifting finely divided

superior record material thereon to form the record surface proper, and then when the whole is sufficiently heated to render it plastic, it is placed on the heated matrix with the superior record material in contact with the matrix, subjected to pressure while still heated, and then cooled under pressure. In this process, it has been found difficult to uniformly and evenly distribute the superior record material over the inferior body portion in the thin film required, and in a large number of cases the superior record material would be so thin in spots that the record would wear out at these spots long before the record as a whole was worn out, thus making a defective record. Furthermore, this objection could not be discovered until the record was actually put in use by the consumer.

The present invention has for its object to provide a method by means of which the body portion of the record may be composed of inferior thermoplastic material and the surface portion thereof composed of a thin layer or film of superior thermoplastic record material without the employment of a separating sheet of paper or other fibrous material which caused the wrinkles and blisters above referred to and without danger of the thin spots referred to in the last above described process.

In practising the present invention, I proceed as follows: I prepare a disk of inferior thermoplastic record material of any suitable well-known composition for the body portion of the record. I then take a sheet of paper, cloth or other fibrous support, waxed coated paper being preferred, and deposit thereon a film of any suitable superior thermoplastic record stock such as the ordinary well-known record composition rich in shellac, or any other suitable superior thermoplastic record material. Preferably said superior stock is deposited in a plurality of films or layers. When the ordinary record stock is employed, the same is deposited preferably in two layers, the first of which is in powdered condition and after being deposited and subjected to heat to soften the shellac content to render it adhesive, a second layer, preferably much more finely divided or pulverized, is deposited thereon and the same then subjected to heat



after which it is subjected to pressure, as by being passed between pressure rolls. There is thereby formed on the surface of the support (preferably waxed paper) a thin sheet or film of superior thermoplastic record material of uniform thickness. The paper disks thus coated may then be allowed to cool and laid away in stock for future use, or they may be immediately used while still heated.

Having thus prepared the disk of inferior thermoplastic material for the body of the record and the disk of superior record material for the face portion of the record on a support of paper or other material, the two are rendered plastic by being suitably heated, and I then proceed as follows: I apply the superior record material, face down, upon a suitably heated matrix, preferably having placed the usual label on the matrix, after which I peel off the paper support or other backing from the superior thermoplastic record material. This peeling off is facilitated by the wax on the paper, if wax or other equivalent material has been used, and by the heated condition of the record material itself. I then apply the inferior body portion or backing on top of the superior record material and subject the whole to pressure in the presence of heat, whereby the superior record material takes the impression from the matrix and also is caused to firmly adhere to the inferior body portion. I then chill the record and matrix under pressure, and separate the pressed record from the matrix.

If a double faced record is to be pressed, I proceed as indicated above until the inferior body portion of the record is in position, take a second disk of superior record material while on its support, heat the same, lay it face downward upon a second heated matrix, and then peel off the paper sheet or support and reverse this second matrix with its applied layer of superior record material onto the upper side of the aforesaid body portion of the record, and then subject the whole to pressure while still heated, and while under pressure permit the matrices and the record to cool and then separate the matrices and the pressed record.

I have found by numerous experiments that when the record is made according to the method just described, I am enabled to provide the inferior body portion of the record with a facing or facings of superior record material in the form of a thin film and hence without any waste of material, which film is so uniformly distributed that no thin and defective spots occur in the finished record. I thereby avoid the defects incident to the use of a separating sheet and also the defects incident to the old method of applying the superior record material by sifting it directly upon the face of the inferior body portion. Moreover, the layer

or film of superior record material when applied to the inferior body portion is thoroughly compacted by reason of the previous application of heat and pressure so that a perfectly homogeneous film of superior record material is provided which results in a high grade record at a minimum expense for material. Furthermore, I entirely eliminate the personal equation (judgment of the different operators or pressmen) and am enabled to practice all of the important steps which determine the superiority or quality of the record by machinery.

Having thus described my invention, what I claim is:—

1. The improved process of pressing a sound record from a matrix which consists in preparing a thin film of superior record material upon a suitable support or sheet, placing said film of superior record material in a heated condition in contact with a heated matrix, removing the said sheet, applying a heated layer of inferior record material to the back of said layer of superior record material, and subjecting the whole to pressure in the presence of heat.

2. The process of pressing a sound record from a matrix which consists in forming a thin film or layer of superior thermoplastic record material on a suitable sheet or support, applying said layer of superior record material in a heated condition to a heated matrix, removing the support, applying a body of inferior thermoplastic record material in heated condition to the back of said superior record material, placing a second film of superior thermoplastic record material in a heated condition upon a second heated matrix, removing the support from said film of superior record material, placing the back of said second film of superior record material on top of the said body of inferior record material, and subjecting the whole to pressure in the presence of heat.

3. The process of pressing a sound record from a matrix which consists in applying a plurality of layers or films of superior record material one above the other to a sheet of paper, heating and compacting the same (while heated) under pressure, applying said film of superior record material in a heated condition to a heated matrix, removing the paper, applying a body of inferior thermoplastic record material in disk form to the back of said superior record material, and subjecting the whole to pressure in the presence of heat.

4. The process of making a sound record from a matrix which consists in applying a plurality of layers or films of superior record material one above the other to a sheet of waxed paper, heating and compacting the same (while heated) under pressure, applying said film of superior record ma-

terial in a heated condition to a heated matrix, removing the waxed paper, applying a body of inferior thermoplastic record material in disk form to the back of said superior record material, and subjecting the whole to pressure in the presence of heat.

5 In testimony whereof I have signed this

specification in the presence of two subscribing witnesses.

MERVIN E. LYLE.

Witnesses:

J. S. GRIFFITH,

F. B. LAPORTE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

*Class 18. Plastics*

*Processes - sound record,*

*Sub. class - 48.4 facing or uniting*



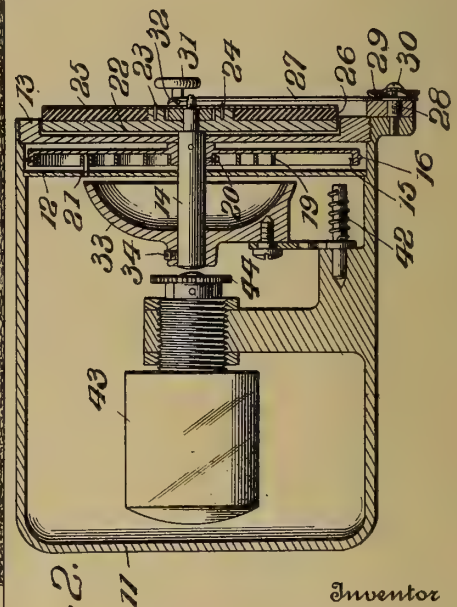
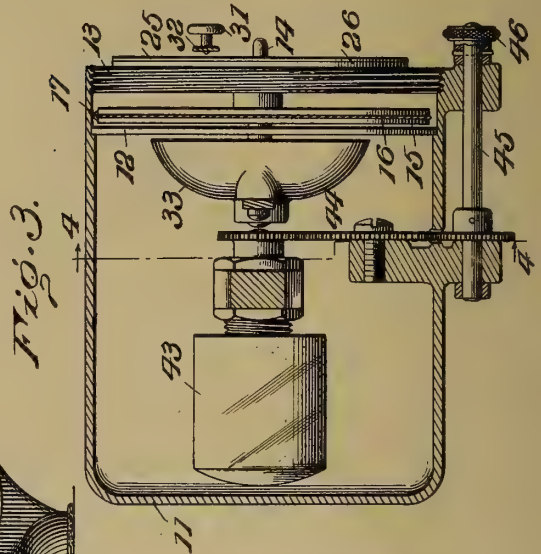
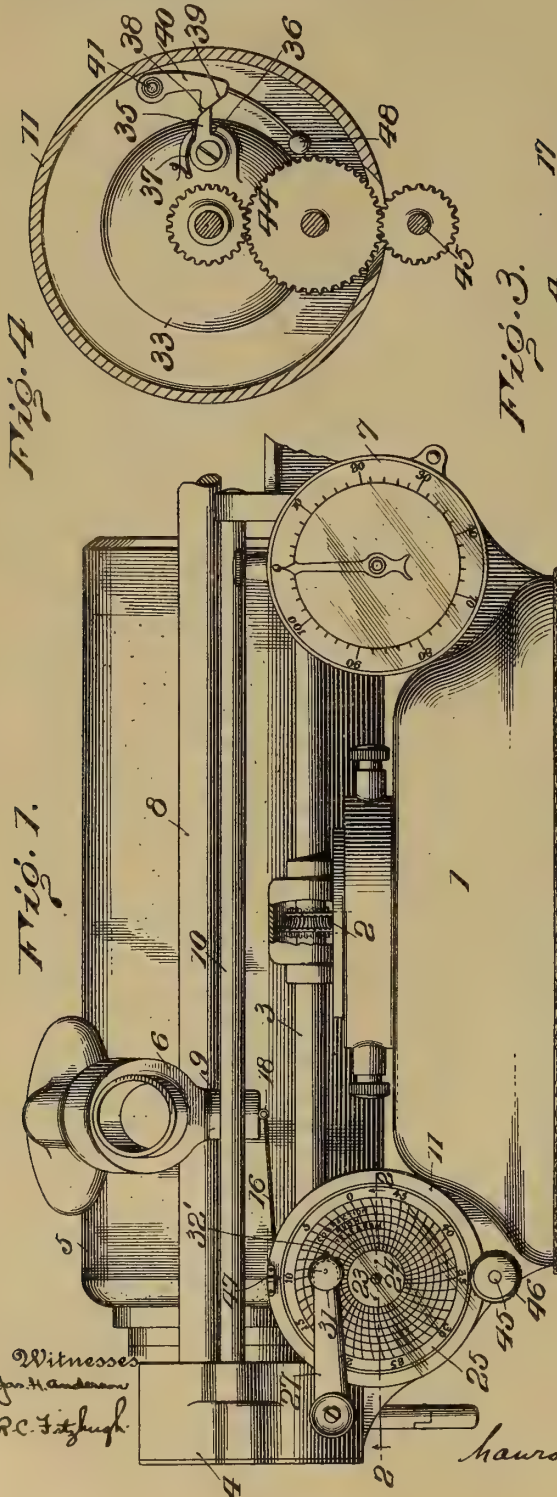


CORRECTION DEVICE FOR TALKING MACHINES,  
#1,153,665-----Clinton E. Woods,  
Patented-September 14, 1915.  
Filed-February 4, 1914.

C. E. WOODS.  
CORRECTION DEVICE FOR TALKING MACHINES.  
APPLICATION FILED FEB. 4, 1914.

1,153,665.

Patented Sept. 14, 1915.



*Clinton E. Woods,*  
*By* *Lawrence Emerson Lewis & Cassie*  
*Attorneys*



# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## CORRECTION DEVICE FOR TALKING-MACHINES.

1,153,665.

Specification of Letters Patent. Patented Sept. 14, 1915.

Application filed February 4, 1914. Serial No. 816,568.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Correction  
5 Devices for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to talking machines, and more particularly to correction  
10 devices employed in machines used for dictation purposes, when the record is to be transcribed, and it is desired by the dictator to impart certain information in regard thereto to the transcriber. For example, a  
15 record having a variety of matters thereon, among which may be a telegram or other rush work, may be delivered by the dictator to a transcriber, or the dictator may desire  
20 dictated, as by erasing or changing certain parts, etc.

The object of the present invention is to provide a convenient, simple and accurate means whereby the dictator can indicate to  
25 the transcriber just what action he desires taken.

With this end in view, the invention consists in a revoluble disk actuated by the  
30 sound-box carriage of the machine, and preferably so as to make one complete revolution during the time that the sound-box is traveling the length of the record-tablet, combined with means whereby the dictator  
35 may mark the disk at the point where a correction is to be made, telegram taken off, or other desired matters attended to. This disk is removed from the dictation machine with the record, and is placed upon the  
40 transcriber's machine and, in coöperation with a fixed scale, indicates the position in which the transcriber is to place the sound-box for taking off the telegram or other matter.

The device is capable of being applied to  
45 any suitable talking machine provided with a traveling sound-box, and is shown in the present application, for the sake of illustration, as applied to the form of machine shown in my pending application Serial No.  
50 814,174, filed January 24, 1914.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the ac-

companying drawings, but it is to be ex- 55  
pressly understood that such drawings are for the purpose of illustration only, and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose. 60

In said drawings—Figure 1 is a front elevation of a talking machine showing my invention applied thereto; Fig. 2 is a horizontal section through the correction device taken on the line 2—2 of Fig. 1, looking in  
65 the direction of the arrow, parts being shown in elevation; Fig. 3 shows the parts of the correction device in side elevation, and the inclosing chamber in central vertical section; and Fig. 4 is a vertical section  
70 of Fig. 3 on the line 4—4.

Referring to the drawings, in which like reference numerals indicate like parts, 1 is the base of the talking machine, containing a suitable motor connected by the gearing  
75 2 to the shaft 3, which on its left-hand end is connected with suitable gearing in a gear-box 4 for driving the record 5 and the sound-box carriage 6. The right-hand end of the shaft 3 is connected, in a suitable way  
80 (not shown), to a speed-governing device 7, which may be of any desired construction. It will be understood that the sound-box 6 is propelled along the slide-way 8 by  
85 the usual feed-screw inclosed in said slide-way, and is prevented from turning around said slide-way by the engagement of the tail 9 of the sound-box with the guide-rod  
90 10, all of which are preferably constructed in a manner fully set forth in my afore-mentioned application.

Suitably mounted upon the talking machine, and preferably upon the base 1 thereof, is a chamber 11, here shown as cylindrical in cross-section, which chamber is provided  
95 near its forward end with a partition 12, and at its front is closed by a wall 13, screw-threaded into the chamber 11, as shown in Figs. 2 and 3. A shaft 14 has bearing in the partition 12 and the wall 13, and pro-  
100 jects outward through the wall 13 and to the rear of the partition 12, and on the said shaft, there is keyed a drum 15, around which drum there is passed a cord or band 16, with one end thereof secured to the  
105 drum and the other end passing outward through an opening 17 (Fig. 3), and connected to the sound-box carriage at 18. A



spring 19 has one end thereof secured to the drum at 20 (Fig. 2), and the other end thereof secured to the partition 12 at 21.

On the forward or outwardly projecting end of the shaft 14, there is mounted a disk 22 provided with means, as two pins 23 and 24, for securing a paper disk 25 to the disk 22 to compel it to move therewith. Preferably, there is placed between the disk 22 and the paper disk 25 a suitable padding 26 to form a bed for the paper, which padding 26 is preferably of material, as felt, that will yield sufficiently to permit the paper disk 25 to be punctured, as hereinafter described.

A spring blade or lever 27 is pivotally mounted at 28 at one side of the disk 22, and preferably on the frame-work of the machine, said spring blade or lever 27 being frictionally retained in any adjusted position, by means of the spring clamp 29 secured in position by the screw 30. The spring blade or lever 27 is preferably provided with a handle or knob 31, by means of which it may be manipulated by the operator, and has, in close juxtaposition to the face of the paper disk 25, a marking point or member 32, here shown as a metal point, by means of which the operator is enabled to puncture or perforate the paper disk, the felt disk 26 yielding to permit this action. But while this particular form of marking point is preferred, any other means of marking the surface of the paper disk (as, for example, a lead point) may be employed within the spirit of the invention. The extreme end of the spring blade or lever 27 or the knob 31 has thereon a pointer 32', pointing toward the word "Correction," "Rush," "Telegram," etc., when the lever is adjusted in the desired position.

On the portion of the shaft 14 which projects inward through the partition 12, a bell 33 is secured, as by a set-screw 34, so that the bell revolves with the shaft 14. Pivoted to the bell 33 is a pawl 35 (Fig. 4) normally held against a lug or pin 36 by a spring 37, which spring, however, permits the pawl to yield or move toward the spring, as hereinafter described. This pawl 35 has a cam face 38, which engages a corresponding cam face 39 of an arm 40 pivoted at 41 to the wall of the chamber 11, the arm 40 turning about its pivot, and having one end of a spring 42 secured thereto and the other end secured to the fixed pivot, as clearly illustrated in Fig. 2.

If desired, the portion of the chamber 11 to the rear of the bell may be employed for housing other parts of the mechanism, and as here shown in outline, it is used to house a switch 43 for controlling the electric motor, which switch is operated through a train of gearing 44 and a shaft 45 having a knurled end 46 projecting to the front; but as such switch mechanism forms no part of

the present invention, it is not illustrated in detail.

The face of the paper disk 25 has thereon a series of concentric circles, here shown as eight, leaving suitable spaces between the circles, and these circles are crossed by approximately radial lines, but preferably struck on a slight curve, with the pivotal point of the spring blade 27 as a center. These radial lines divide the circumference of the disk into equal parts, and a scale is marked around the circumference. Between the concentric circles on the face of the paper disk there is printed or written, or otherwise indicated, information as to the character of the correction or other action to be taken by the transcriber, for example, as here shown, the words "Correction," "Rush" and "Telegram." At a certain point, and preferably at the top edge of the front of the wall of the chamber 11, there is a pointer 47 (Fig. 1), and when the sound-box carriage 6 is in its extreme left-hand position, and ready to commence the dictation which is to form the record on the record tablet 5, the zero point of the disk 25 is immediately opposite said pointer 47.

Operation: The machine having been started, the sound-box carriage 6 is propelled from left to right in Fig. 1, and as it does so, it acts to unwind the cord 16 from the drum 15, thereby serving to revolve the drum, and with it the shaft 14 and the paper disk 25, against the tension of the spring 19. The diameter of the drum 15 is such that when the sound-box carriage 6 has reached its extreme right-hand position, the paper disk 25 will have made one complete revolution, and have brought the zero point on the scale again opposite the pointer 47, and when the carriage is returned to its normal position at the extreme left, the spring 19 acts to revolve the drum 15 in the reverse direction, and again wind the cord or band 16 thereon. Now let it be assumed that when the carriage has reached the position shown in Fig. 1, with the paper disk 25 standing with the scale figure "10" thereon opposite the pointer 47, the dictator desires to dictate a telegram. He turns the spring blade arm or lever 27 on its pivot until the pointer 32' points to the circle immediately under the word "Telegram", and depresses the button 31, thereby causing the marking point 32 to mark the disk 25 (as by making a perforation). This mark or perforation will be on one of the curved radial lines actually marked on the paper which is opposite the indicating point 47, or on an imaginary radial line of the same kind which, if extended, would be under the point 47. This necessarily follows, since the marking point 32 is on a curved line passing through the center of the disk and the point 47, drawn with the pivotal point of the



spring blade 27 as a center. When the record 5 is removed from the dictating machine and passed to the transcriber, the paper disk 25 is also taken off, and is placed in position on the transcribing machine. The transcriber at once sees that the disk is marked on the circle under the word "Telegram", and understands that this is for immediate attention, and therefore advances the sound-box carriage 6 until the index "10" opposite the mark on the disk registers with the pointer 47 on her machine, and proceeds at once to take off the telegram. In like manner, any rush work which may be at any particular part of the record tablet 5, is taken off by placing the sound-box carriage 6 in a position to cause the proper mark on the disk 25 to come opposite the index point 47, when the transcriber proceeds to take off such work.

The pawl 35 on the bell 33 is so positioned that it contacts with the spring pawl 40 just before the sound-box carriage 6 has reached its extreme right-hand position, and thereby acts to raise the pawl 40 against the tension of the spring 42, until the cam face 38 on the pawl 35 has passed the cam face 39 on the pawl 40, when the spring promptly returns the pawl to its normal position, and in doing so causes a striker 48 (Fig. 4) to impinge upon and ring the bell, thus indicating to the operator that the limit of dictation of that particular record tablet has been reached. When the sound-box carriage is returned to its normal position, the spring pawl 35 is enabled to pass the striker pawl 40, by reason of the yielding action of the two spring-pressed pawls, as will be readily understood.

While, for the purpose of particularly describing the invention, the same has been herein set forth in considerable detail, it is to be understood that the invention is not limited to all such precise details, since equivalents may be substituted therefor, and in some cases parts thereof, as for example, the bell, may be omitted, without varying the spirit or scope of the invention, which is defined in the appended claims.

What is claimed is:—

1. In a device of the character described, the combination of a rotatable disk having instruction characters and a scale thereon, with a talking machine sound-box carriage, operative connections between said carriage and disk whereby the latter is rotated, and a marking device adjustable in approximately a radial line over the surface of said disk.

2. In a device of the character described, the combination of a shaft, a disk mounted on said shaft and having instruction characters and a scale thereon, with a talking machine sound-box carriage, operative connections between said carriage and shaft

whereby the shaft is rotated, and a marking device adjustable in approximately a radial line over the surface of the disk.

3. In a device of the character described, the combination of a disk having a series of concentric circles thereon and instruction characters in the spaces between the said circles, with a talking machine sound-box carriage, means rotating the disk synchronously with the movement of said carriage, and a marking device adjustable in approximately a radial line over the face of the disk.

4. In a device of the character described, the combination of a disk having a series of concentric circles and approximately radial lines thereon and instruction characters in the spaces between the circles, with a talking machine sound-box, means moving the sound-box along its support and rotating the disk synchronously therewith, and a marking device adjustable in approximately a radial line over the face of said disk.

5. In a device of the character described, the combination of a disk having instruction characters thereon, a talking machine sound-box, means moving the sound-box and rotating the disk synchronously therewith, and a marking device in coöperative relation with said disk.

6. In a device of the character described, the combination of a disk having instruction characters thereon arranged at different radial distances from the center of the disk, with a talking machine sound-box, means simultaneously moving the sound-box and rotating the disk, and a marking device mounted in coöperative relation with said disk.

7. In a device of the character described, the combination of a disk having instruction characters thereon and a peripheral scale, a stationary pointer in proximity to said scale, a talking machine sound-box, a sound-box carriage, operative connections between said disk and sound-box carriage whereby the former is rotated, means moving said sound-box carriage, and an adjustable marking device mounted in coöperative relation with said disk.

8. In a device of the character described, the combination of a revoluble shaft, a correction disk secured to and revolving with said shaft, a drum secured to the shaft and revolving therewith, a spring mounted to be wound up when the shaft is revolved in one direction and to revolve the shaft in the reverse direction when freed, a sound-box and a mandrel carrying a record tablet, and means simultaneously advancing the sound-box along the record tablet and revolving said shaft.

9. In a device of the character described, the combination of a sound-box and a rev-



oluble shaft, means simultaneously moving the sound-box and revolving the shaft, a correction disk mounted on the shaft to revolve therewith, and a marking device mounted in coöperative relation with said disk.

10. In a device of the character described, the combination of a revoluble disk and a marking device mounted in coöperative relation therewith, with a sound-box, and means simultaneously moving the sound-box and revolving the disk.

11. In a device of the character described, the combination of a revoluble correction disk provided with a peripheral scale and approximately radial lines, a fixed index point normally opposite the zero point of said scale, a marking device mounted in coöperative relation with said disk with its marking point adjustable along the radial lines thereof, a sound-box, and means simultaneously advancing the sound-box and revolving said disk.

12. In a device of the character described, the combination of a revoluble shaft having a correction disk holder secured thereto, a correction disk mounted on said holder, a marking device mounted in coöperative relation with said disk, a sound-box, and means simultaneously advancing the sound-box and revolving said shaft.

13. In a device of the character described, the combination of a revoluble correction disk, a bell mounted to revolve with said disk, a marking device in coöperative relation with the disk, a striker, and means for operating said striker at a predetermined point in the revolution of the disk.

14. In a device of the character described, the combination of a revolving correction disk, a bell mounted to revolve therewith, a sound-box, means simultaneously advancing the sound-box and revolving the disk, a striker, and means operating the striker when the sound-box has reached the extreme limit of movement.

15. In a device of the character described, the combination of a sound-box and a revoluble correction disk, a spring-blade pivotally mounted to extend over the face of the disk, a marking point carried by said spring-blade, and means for simultaneously advancing the sound-box and revolving said disk.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN S. GRIFFITH,  
JOHN R. PETRIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH PATENT.

ACOUSTIC DIAPHRAGM,  
#1,153,837-----W. W. Young,  
Patented-September 14th, 1915.  
Filed-September 22nd, 1914.

W. W. YOUNG.  
ACOUSTIC DIAPHRAGM.  
APPLICATION FILED SEPT. 22, 1914.

1,153,837.

Patented Sept. 14, 1915.

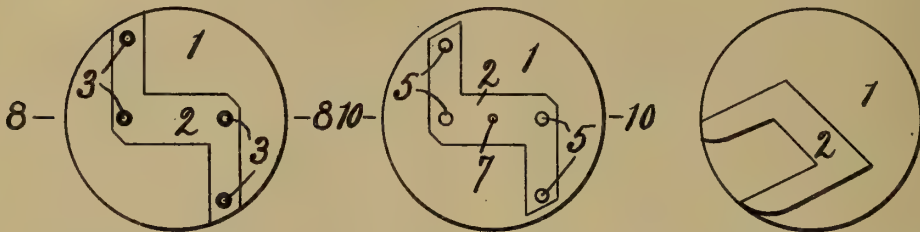


FIG. 1.

FIG. 2.

FIG. 3.

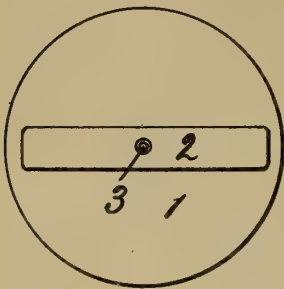


FIG. 4.



FIG. 5.

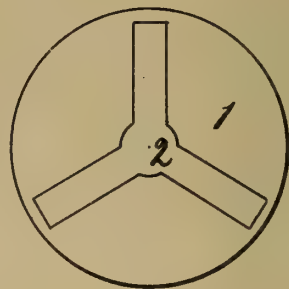


FIG. 6.



FIG. 7.



FIG. 8.

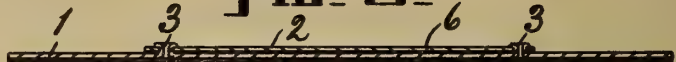


FIG. 9.

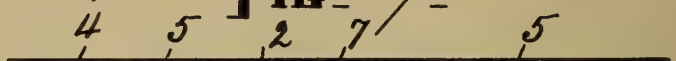


FIG. 10.

WITNESSES:

A. C. Fairbanks  
H. J. Cutter

INVENTOR.

William W. Young,

BY

Webster & Co.  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

WILLIAM W. YOUNG, OF AGAWAM, MASSACHUSETTS, ASSIGNOR TO FRANK H. YOUNG,  
OF ST. LOUIS, MISSOURI.

## ACOUSTIC DIAPHRAGM.

1,153,837.

Specification of Letters Patent. Patented Sept. 14, 1915.

Application filed September 22, 1914. Serial No. 862,914.

*To all whom it may concern:*

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing at Agawam, in the county of Hampden and State of Massachusetts, have invented a new and useful Acoustic Diaphragm, of which the following is a specification.

My invention relates to improvements in diaphragms for use in telephones, talking-machines, and the like, to reproduce sound, and consists essentially of a thin metallic or fiber base or body piece, to which is closely, intimately and securely attached a stay or brace which extends from the center of such body piece in one or more directions, all as hereinafter set forth.

I have found that an acoustic diaphragm should, in order to give the best results, be made of very thin material, but inasmuch as a diaphragm, if made of too thin material, is unable to endure the strain to which a diaphragm must necessarily be subjected, means must be provided for reinforcing, stiffening and strengthening the same, without impairing its acoustic qualities or rendering it appreciably less sensitive than would be the case if the device were not provided with said means. As just intimated, however, a diaphragm as sensitive as desired would be impracticable without the addition of the aforesaid reinforcing, stiffening and strengthening means or brace, the body part being too thin to endure for any length of time what may be termed the piston action to which said body is subjected when in use. A centrally disposed member having an extended part or parts, which member with its parts is properly secured to the main portion or body of the diaphragm, is quite capable of affording the necessary amount of reinforcement to said body, however thin the latter may be, so that a most serviceable diaphragm is produced. The reinforcing member or brace may be made in various shapes or forms, so long as there is a part to augment the central portion of the body and one or more parts to support directly and indirectly the other portions of said body. Thus constructed the diaphragm is sensitive to the least vibration, yet rigid enough to carry any volume of sound or combination of

sounds, either vocal or instrumental, without blasting, rattling, or flattening out.

The piston action, to which reference has been made, covers or includes practically the entire area of a diaphragm constructed in accordance with my invention, the brace never being heavy or thick enough to prevent or interfere with such action, but on the contrary augmenting or enhancing it, wherefore the vibrations imparted to the diaphragm produce sound waves that bring out fuller, clearer, rounder and more natural reproductions than is possible with single-piece plain or crimped diaphragms. With either of the latter the vibrations have only a limited range from the center, and blasts on high vocal and instrumental notes are inevitable.

The primary object of my invention is to produce, in accordance with the foregoing, a sound-reproducing device or diaphragm which gives out sound that more nearly simulates the original sound than has been possible heretofore, and this with increased rather than diminished volume.

Other objects will appear in the course of the following description.

I attain the objects and secure the advantages of my invention by the means illustrated in the accompanying drawings, in which—

Figures 1 to 7, inclusive, are plans of various diaphragms which embody practical forms of the invention; Fig. 8, an enlarged cross-section taken on lines 8—8, in Fig. 7; Fig. 9, a similar cross-section but showing a slight modification in construction, and, Fig. 10, a cross-section on lines 10—10, Fig. 3.

Similar reference numerals designate similar parts throughout the several views.

I have not illustrated all of the shapes or forms of braces that are available, but have shown a sufficient number fully to disclose my invention.

In the drawings a base or body in the form of a disk appears at 1. This disk may be made of either very thin metal or of very thin fibrous material or fabric, an example of the latter appearing in Figs. 3 and 10. Mounted on or attached to each disk 1 is a brace 2. The brace 2 in every case has a part at the center of its disk 1, and one or



more parts extending from said first-mentioned part. In some examples what may be termed the arms or branches of the brace 2 extend quite to the periphery of the underlying disk 1, as in Figs. 1 and 3, while in other examples such arms or branches do not extend so far but fall short of such periphery, as in the other views, it being immaterial so far as my invention is concerned whether or not the brace extends clear to the disk periphery. The braces 2 are made of any thin material which is suitable for the purpose, sheet-metal being a good material and entirely practical. The brace 2 is preferably countersunk in the disk 1, whether the latter be of metal or of fiber or fabric, as clearly shown in Figs. 8 and 10, although it is possible to attach said brace on the surface of a plain disk which has no countersink therein, as is represented in Fig. 9.

Various means may be employed for securing the brace in place to the disk and I will next describe what I have thus far discovered to be among the best means for that purpose. The disk 1 when of metal may have holes punched therein and the metal around the edges of such holes on one side upset, after passing through openings provided therefor in the superimposed brace 2, onto the contiguous or exposed side of said brace, as shown at 3 in Figs. 1, 8 and 9. By this means the brace is securely fastened to the disk. Similar means, but centrally located, are employed in the Fig. 4 diaphragm. It is necessary to cover the holes left in the diaphragm by the aforesaid punching and upsetting operations, and to this end an integument 4, of paper or other suitable thin material, is attached through the medium of suitable adhesive material to the disk, either over the brace, as in Fig. 8, or on the opposite side, as in Fig. 9. This integument, where glued or cemented over and to the brace as well as the disk, serves as an additional fastening or securing means, and will be the only such means when the disk is of fiber or fabric, as represented in the last view.

In Figs. 2 and 3 the fibrous material of the disk 1 is represented at 5 as being forced into the holes provided in the brace 2 for the rivet elements punched from the disk when the latter consists of metal. The integument 4 may be placed over the brace 2 in all cases, since all of the elements are so comparatively thin. This integument may be employed exclusively in all cases or without the rivet elements in the metal disks. The integument or an equivalent covering or coating is most always used as a securing or fastening means for the base, regardless of the nature of other fastening or securing means or whether or not any other such means be present, and even when an

integument is applied to the under side of the disk 1, or the side opposite that to which the brace 2 is affixed, as in Fig. 9, another integument will usually be applied to the other side also, over the brace. In order to preclude any possibility of independent movement as between the disk, especially when the same is of metal, and its brace, and consequent rattle, a fabric insert 6, having adhesive material on both sides, may be introduced between said disk and brace—see Figs. 8 and 9. A diaphragm designed for use in a talking-machine should have a central opening 7.

For most purposes the form of brace 2 illustrated in the first two views, which consists of a middle bar with arms extending from the ends thereof in opposite directions, is perhaps most efficient, because it seems to provide just the proper amount of mass or substance at the center of the disk 1, and the required support properly distributed or placed for the peripheral and intermediate portions of said disk. The brace 2 in Fig. 3 differs from the first in that the arms extend in the same direction from the ends of the middle bar. Merely a straight bar is used for the brace 2 in Fig. 4, but this is long enough to afford the necessary support for the peripheral and intermediate portions of the disk 1, besides providing the extra mass at the center. The apex of the angular brace 2 in Fig. 5 augments the center of the disk 1, and the two arms support the other portions of said disk. In Fig. 6 a third arm is present, but this form of brace is liable to be too rigid unless great care be exercised to proportion the parts exactly right. The Fig. 7 brace is quite similar to the Fig. 3 brace, except the former is curved.

From the foregoing description it is clear that I should not be unduly restricted by what I have illustrated in the drawings. The integument is omitted from each of the several plans.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An acoustic diaphragm comprising a disk having a countersink therein, a brace having a part that is centrally located on said disk, and a part that extends from said first-mentioned part away from the disk center, said brace being set into said countersink, and means to secure said brace rigidly and fixedly to said disk to secure the latter rigidly and fixedly to the former.

2. An acoustic diaphragm comprising a disk having a countersink therein, a brace having a part that is centrally located on said disk, and a part that extends from said first-mentioned part away from the disk center, said brace being set into said countersink, and an integument attached to said disk over said brace.

3. An acoustic diaphragm comprising a disk, and a perforated brace for said disk, said disk having rivet elements punched therefrom and passing through the perforations in said brace to retain the latter in place.

4. An acoustic diaphragm comprising a disk, a perforated brace for said disk, said disk having rivet elements punched therefrom and passing through the perforations in said brace to retain the latter in place, and an integument attached to said disk over said brace to assist said rivet elements in rigidly and fixedly securing said brace to said disk.

5. An acoustic diaphragm comprising a disk, a brace for said disk, means to secure said brace to said disk, and a fabric insert between said disk and brace.

6. An acoustic diaphragm comprising a disk having a countersink therein, a brace for said disk, said brace being set into said countersink, and consisting of a part adapted to be centrally located on said disk, and of arms extending from such part toward

the periphery of said disk, and means to secure said brace rigidly and fixedly in place in said disk.

7. An acoustic diaphragm comprising a disk having a countersink therein, a brace for said disk, said brace being set into said countersink, and consisting of a bar adapted to be centrally located on said disk, and of arms extending from the ends of said bar, and means to secure said brace rigidly and fixedly in place in said disk.

8. An acoustic diaphragm comprising a disk having a countersink therein, a brace for said disk, such brace being set into said countersink, and consisting of a bar adapted to be centrally located on said disk, and of arms extending in opposite directions from the ends of said bar, and means to secure said brace rigidly and fixedly in place in said disk.

WILLIAM W. YOUNG.

Witnesses:

F. A. CUTTER,

A. C. FAIRBANKS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various stages of human civilization, from the earliest times to the modern era. He traces the development of the human mind, from the simple instincts of the primitive man to the complex reasoning of the modern philosopher. He also examines the progress of the human race, from the dark ages of ignorance to the bright dawn of knowledge. The author's treatment is comprehensive and thorough, covering all the major events and figures of world history. He provides a clear and concise summary of the past, and offers his own views on the future of the world. The book is written in a simple and straightforward style, making it accessible to all readers. It is a valuable work for anyone interested in the history of the world, and it is highly recommended.

The second part of the book is devoted to a detailed examination of the various branches of human knowledge. The author discusses the sciences, the arts, the letters, and the professions. He examines the progress of each branch, from its earliest beginnings to its present state. He also discusses the various methods of acquiring knowledge, and the different schools of thought. The author's treatment is thorough and detailed, covering all the major branches of human knowledge. He provides a clear and concise summary of each branch, and offers his own views on its future. The book is written in a simple and straightforward style, making it accessible to all readers. It is a valuable work for anyone interested in the history of human knowledge, and it is highly recommended.

Patented-September 28th, 1915.  
Filed-January 3, 1914.

TONE ARM CONNECTION FOR TALKING MACHINES,  
# 1,155,064-----W. H. Hoschke,  
Patented-September 28th, 1915.  
Filed-January 3, 1914.

W. H. HOSCHKE.  
TONE ARM CONNECTION FOR TALKING MACHINES.  
APPLICATION FILED JAN. 3, 1914.

1,155,064.

Patented Sept. 28, 1915.

Fig. 1

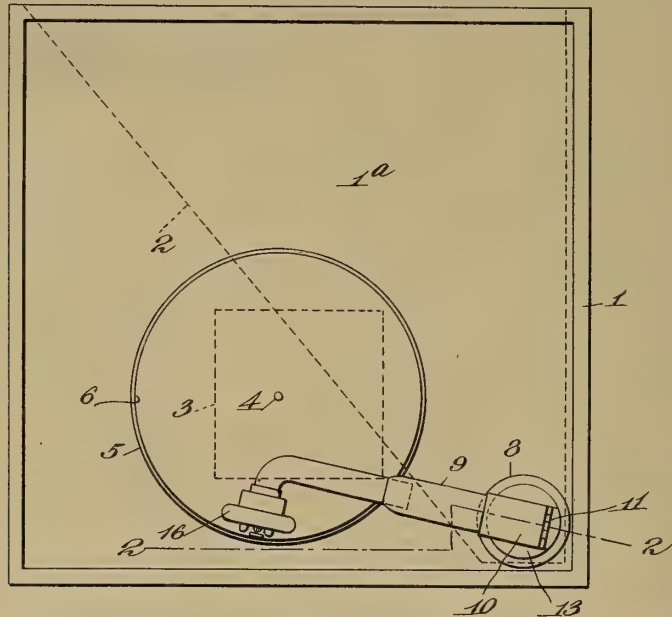


Fig. 3

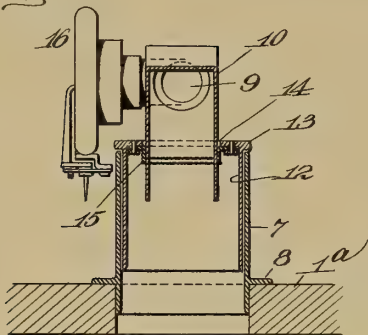
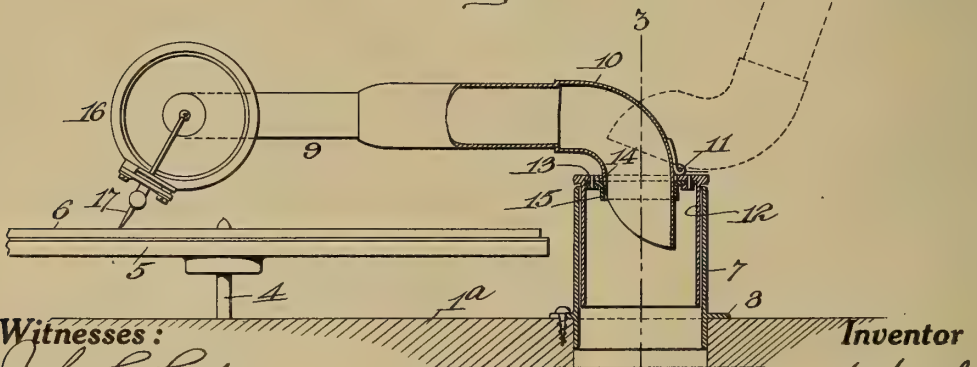


Fig. 2



Witnesses:

John L. Lotch.  
M. Jones

Inventor

William H. Hoschke  
by *Waldo H. Morse* Attorneys.



# UNITED STATES PATENT OFFICE.

WILLIAM H. HOSCHKE, OF NEW YORK, N. Y., ASSIGNOR TO CRESCENT TALKING MACHINE COMPANY, INC., A CORPORATION OF NEW YORK.

## 1. TONE-ARM CONNECTION FOR TALKING-MACHINES.

1,155,064.

Specification of Letters Patent.

Patented Sept. 28, 1915.

Application filed January 3, 1914. Serial No. 810,144.

*To all whom it may concern:*

Be it known that I, WILLIAM H. HOSCHKE, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented a certain new and useful Tone-Arm Connection for Talking-Machines, of which the following is a specification.

The object I have in view is to produce a tone arm for talking machines or the like which will provide an uninterrupted passage for the sound waves from the reproducer to the horn, resonator or other sound conveying means.

Another object is to produce a tone arm in which all the movable connections are outside the path of the sound waves.

A further object is to produce a tone arm wherein the moving parts are so proportioned and arranged as to offer the least possible resistance to the movements of the arm.

A further object is to produce a tone arm by means of which the needle socket may be rendered easily accessible to facilitate the insertion and removal of the needle.

These and further objects will appear from the following specification and accompanying drawings, considered together or separately.

My invention is illustrated in the accompanying drawings in which the same parts are designated by similar reference characters in all of the figures.

Figure 1 is a plan view partly in section of a talking machine with my invention illustrated and properly adjusted, and in working condition. Fig. 2 is a transverse section of the same taken on the line 2—2 of Fig. 1; and Fig. 3, is a detail section taken on the line 3—3 of Fig. 2.

In the drawings 1 represents a talking machine cabinet provided with a top 1<sup>a</sup>. Within the cabinet and extending from one corner thereof is a horn or diffuser 2 of any preferred type. Carried within the cabinet is a motor 3 provided with a shaft 4 and a turntable 5. The turntable 5 carries a disk record 6 in the usual manner.

The top 1<sup>a</sup> is perforated at one corner thereof and in this perforation is fitted a sleeve 7. The sleeve is provided with a flange 8 by means of which it is secured to the top. The sleeve offers communication to the smaller inner end of the horn or diffuser.

9 represents the tone arm which may be of any recognized construction. The inner enlarged end of the tone arm is provided with an elbow 10 which is hinged at 11 to the top 13 of an extension 12. The extension 12 is carried in the sleeve 7 with the projecting edge of its top 13 resting on the upper edge of the sleeve. The body of the extension 12 makes a loose fit with the bore of the sleeve, thereby facilitating the turning movement of the extension relatively to the sleeve. The top 13 of the extension is provided with an opening 14 through which the elbow 10 projects. The lower end of the elbow which projects into the extension when the tone arm is in its normal position is rounded on the arc of a circle of which the hinge 11 is the center so that the arm may be swung up away from the record. To the under side of the top 13 is secured a skirt 15 of leather or other suitable flexible material which forms a close contact with the lower end of the elbow when it is within the extension and prevents exit of sound waves from the top of the same.

The outer end of the tone arm is provided with the usual speaker or reproducer which carries a needle or other device for engagement with the record groove.

It will be seen that with my improved tone arm and connections the passage of the sound waves from the reproducer to the interior of the casing will be in a straight line and entirely unimpeded and free of obstructions. When it is desired to insert or remove a needle the arm may be swung back to the position shown in dotted lines in Fig. 2 so that the needle socket and set screw will be within easy reach and in the direct line of sight of the operator. This is an important feature of my invention, as in all previous devices with which I am familiar, the needle socket is always in close proximity to the record disk and in the shadow of the sides or cover of the casing, thereby rendering the operation of putting in or taking out a needle a more or less difficult and dangerous operation.

With my improvement, when it is desired to remove the tone arm from the machine it is simply necessary to lift the arm and with it the extension 12 from the sleeve 7 which may be accomplished without the use of even the simplest tools.

Throughout this specification and in the accompanying drawings, I have illustrated and described my invention in connection with a talking machine of the disk type, but  
5 it is to be understood and it is obvious that my invention is equally applicable and adaptable to talking machines of the cylindrical type, and that I do not limit my invention to the disk type of talking machine.  
10 In accordance with the provisions of the patent statute, I have described the principle of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to  
15 have it understood that the apparatus shown is merely illustrative, and that the invention can be carried out in other ways.

Having now described my invention, what I claim as new and desire to secure by  
20 Letters Patent, is as follows:

In a talking machine the combination with a sound diffuser, and a sleeve communicating therewith, of a tubular sound arm, an extension to the arm, an end plate  
25 for the extension, a hinge carried by the end plate and attached to the tone arm, an opening in the end plate through which the end of the tone arm projects, a skirt carried by the end plate and forming a close contact  
30 with the end of the tone arm, and a flange on the extension, said flange resting on the sleeve.

This specification signed and witnessed this 27th day of December, 1913.

WILLIAM H. HOSCHKE.

Witnesses:

GEORGE W. BEHRENS,  
THEODORE LUME.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH PATENTS.

PHONOGRAPH,  
#1,155,572-----N. H. Holland,  
Patented-October 5, 1915.  
Filed-March 21, 1914.

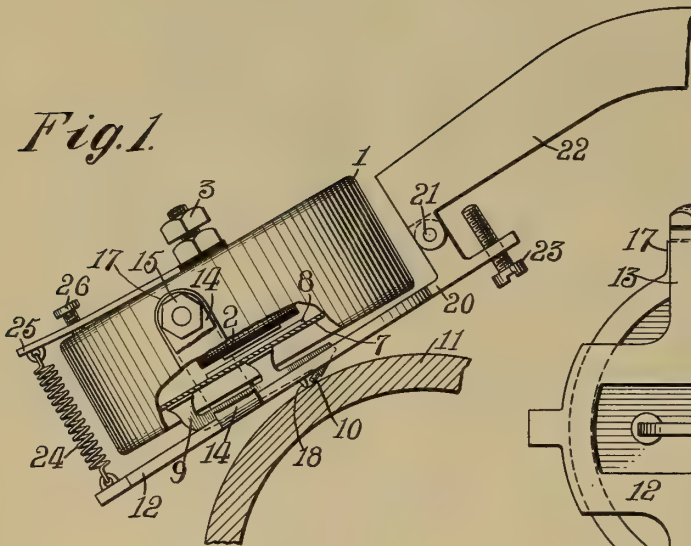


N. H. HOLLAND.  
 PHONOGRAPH.  
 APPLICATION FILED MAR. 21, 1914.

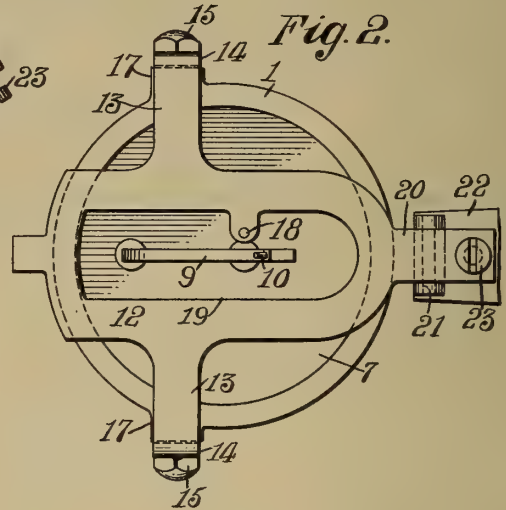
1,155,572.

Patented Oct. 5, 1915.

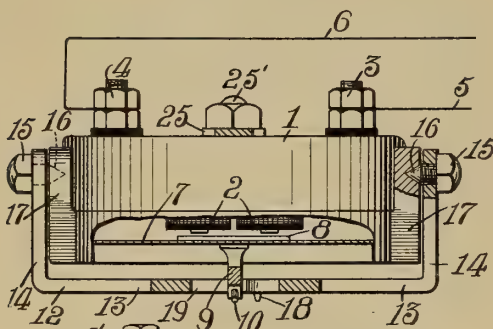
*Fig. 1.*



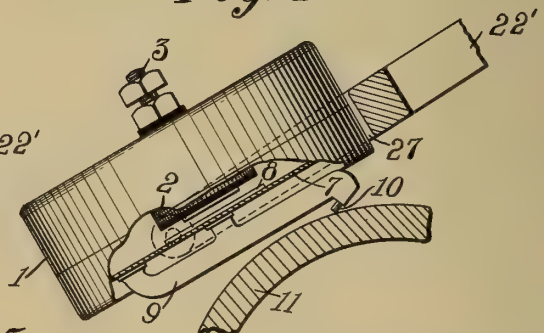
*Fig. 2.*



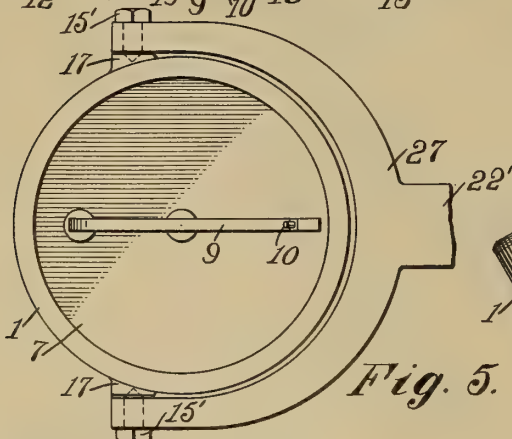
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



WITNESSES  
*J. A. Propoy*  
*Frederick Bachmann.*

INVENTOR  
*Newman H. Holland*  
 BY *Dyer & Holden*  
 his ATTORNEYS

# UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,155,572.

Specification of Letters Patent.

Patented Oct. 5, 1915.

Application filed March 21, 1914. Serial No. 826,138.

*To all whom it may concern:*

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to an improved mounting for a phonographic sound box.

The principal object of the invention is to provide an improved mounting of such a character that the desired pressure of the usual sound box stylus upon the record is effected by the action of gravity upon the sound box itself, the latter being preferably mounted for up and down movement about a horizontal axis located eccentrically with respect to the same. In the preferred form of my invention, the sound box is carried by a support which tracks the phonographic record and serves to take a part of the weight of the sound box off the stylus.

The invention is primarily intended for use in connection with electro-magnetically operable phonographic recorders, but it is not limited to such use.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which—

Figure 1 is a view partly in side elevation and partly in section of one form of my invention applied to an electro-magnetically operable phonograph recorder; Fig. 2 is a bottom plain view of the same; Fig. 3 is a view of the same partly in front elevation and partly in section; Fig. 4 is a view partly in side elevation and partly in section of a modification; and Fig. 5 is a bottom plan view of the modification.

In all the views, like parts are designated by the same reference numerals.

The recorder shown comprises a cylindrical casing 1 provided with an electromagnet 2, the coils of which are electrically connected with binding posts 3 and 4 supported by but insulated from the casing 1. These binding posts are adapted to be connected respectively to the leads 5 and 6 of an electric circuit which may contain a suitable telephone transmitter and source of electric supply (not shown). The casing 1 is provided with and carries a vibratory dia-

phragm 7, the upper surface of which may have secured thereto a metallic plate 8 adapted to be attracted by the electromagnet 2 when the latter is energized. The diaphragm 7 also has secured thereto a stylus arm or lever 9 which carries a recording stylus 10 adapted to engage and operate upon a record cylinder 11. When electric undulations or impulses are impressed upon the circuit containing the leads 5 and 6, the diaphragm 7 and stylus 10 are set into vibration by the action of the magnet 2 upon the metallic plate 8. The specific construction described in this paragraph is well known and is not herein claimed *per se*.

The sound box hereinbefore described is supported by a cradle 12 provided with alined outwardly extending arms 13 which have outer upwardly extending end portions 14 carrying alined pivot screws 15, the latter being provided with conical ends 16 engaged in correspondingly shaped recesses in extensions 17 of the casing 1. The axes of the pivots 15 extend through the casing 1 parallel to the diaphragm 7 and are located a considerable distance to one side of the central axis and the center of gravity of the casing, so that the sound box has a tendency to move downwardly by gravity about the axes of the pivots 15 toward the record cylinder 11 and to force the stylus 10 against and a slight distance into the said cylinder. The cradle 12 is provided with a curved downwardly extending projection or "ball advance" 18 arranged to bear upon the cylinder 11 at a slight distance to one side of the stylus 10, the cradle 12 thereby serving to take a part of the weight of the sound box off the stylus 10. The cradle 12 is provided with an elongated central opening 19 through which the stylus arm 9 extends. An arm 20 extends from the cradle 12 at right angles to the arms 13 and is pivoted for up and down movement as at 21, to the support 22, which may be the usual traveling sound box carrier arm of a phonograph. A screw 23 adjustably mounted in the arm 20 at a point more remote from the sound box than the pivot 21 is arranged to bear on the under side of the support 22 to limit the downward movement of the cradle 12 and the sound box carried thereby. By pivoting the cradle 12 as at 21, the cradle and the sound box are permitted to move freely up and down during



the making of a record and are thereby free to remain in operative engagement with the cylinder 11 regardless of the eccentricity or similar irregularities in the said cylinder.

5 The tendency of the sound box to move downwardly by gravity about the pivots 15 may be counterbalanced to a desired extent as by a tension spring 24 secured at one end to the forward end of the cradle 12, the  
10 said spring being secured at its other end to a flat elastic member 25 secured at its inner end in engagement with the top of the casing 1, as by bolt 25'. A headed screw 26 threaded through the member 25 bears upon  
15 the top of the casing 1 to permit adjustment of the member 25 for the purpose of varying the tension of the spring 24. For any given adjustment, the spring 24 exerts a substantially constant counterbalancing  
20 force, so that by a suitable adjustment of the screw 26, the unbalanced downward pressure of the sound box 1 on the stylus 10 may be regulated to a desired fixed amount.

25 In the modification shown in Figs. 4 and 5, the pivoted cradle support of the sound box is omitted, the sound box being supported from the forked extension 27 of the phonographic carrier arm 22'. The pivots  
30 15' pass through the outer ends of the forked extension 27 and have their conical inner ends located in correspondingly shaped recesses in the extensions 17 of the casing 1. The location of the axes of the pivots 15'  
35 with respect to the sound box is the same as that of the pivots 15 shown in Figs. 1, 2 and 3.

It is understood that my invention is not limited to the specific forms described above,  
40 but that it includes in addition all the modifications falling within the scope of the appended claims.

Having now described my invention what I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a device of the class described, the combination of means for tracking a sound record, and a sound box provided with a vibratory member and a stylus connected to said vibratory member, said sound box being pivotally supported by said tracking means for up and down movement about an axis located to one side of the center of gravity of said sound box, substantially as described.

2. In a device of the class described, the combination of means for tracking a sound record, a sound box provided with a vibratory member and a stylus connected to said vibratory member, said sound box being pivotally supported by said tracking means for up and down movement about an axis located to one side of the center of gravity of said sound box, and means tending to

resist downward movement of said sound box with respect to said tracking means, substantially as described.

3. In a device of the class described, the combination of means for tracking a sound  
70 record, a sound box provided with a vibratory member and a stylus connected to said vibratory member, said sound box being pivoted to said tracking means for up and down movement about an axis located to one  
75 side of the center of gravity of said sound box, and adjustable means tending to resist downward movement of said sound box with respect to said tracking means, substantially as described.

4. In a device of the class described, the combination of record tracking means pivoted for movement about a given axis, and a sound box provided with a vibratory member and a stylus connected to said vibratory  
85 member, said sound box being pivoted to said tracking means for movement about an axis located to one side of the center of gravity of said sound box and substantially parallel to said first named axis, substantially as described.

5. In a device of the class described, the combination of record tracking means pivoted for movement about a given axis, a sound box provided with a vibratory member and  
95 a stylus connected to said vibratory member, said sound box being pivoted to said tracking means for movement about an axis located to one side of the center of gravity of said sound box and substantially parallel to  
100 said first named axis, and means for limiting the pivotal movement of said tracking means, substantially as described.

6. In a device of the class described, the combination of means for tracking a sound  
105 record, a sound box provided with a vibratory member and a stylus connected to said vibratory member, said sound box being pivoted to said tracking means for up and down movement about an axis located to one side of the center of gravity of said sound box, and resilient means tending to resist downward movement of said sound box with respect to said tracking means, substantially as described.

7. In a device of the class described, the combination of means for tracking a sound record, a sound box provided with a vibratory member and a stylus connected to said vibratory member, said sound box being  
120 pivotally supported by said tracking means for up and down movement about an axis located to one side of the center of gravity of said sound box, and means exerting a substantially constant force to resist downward movement of said sound box with respect to said tracking means, substantially as described.

8. In a device of the class described, the combination of record tracking means pivot-  
130



ed for movement about a substantially horizontal axis, and a sound box provided with a vibratory member and a stylus connected to such vibratory member, said sound box  
5 being supported by said tracking means for up and down movement with respect to said means, substantially as described.

9. In a device of the class described, the combination of record tracking means pivoted  
10 ed for movement about a substantially horizontal axis, a sound box provided with a vibratory member and a stylus connected to said vibratory member, said sound box be-

ing supported by said tracking means for up and down movement with respect to said  
15 means, and means exerting a substantially constant force to resist downward movement of said sound box with respect to said tracking means, substantially as described.

This specification signed and witnessed  
20 this 20th day of March, 1914.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,  
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

<p>1. The first part of the report deals with the general situation of the country, and the progress of the various branches of industry and commerce. It is found that the country is in a state of general prosperity, and that the various branches of industry and commerce are all progressing rapidly.</p>	<p>2. The second part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>
<p>3. The third part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>	<p>4. The fourth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>
<p>5. The fifth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>	<p>6. The sixth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>
<p>7. The seventh part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>	<p>8. The eighth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>
<p>9. The ninth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>	<p>10. The tenth part of the report deals with the state of the various branches of industry and commerce. It is found that the various branches of industry and commerce are all progressing rapidly, and that the country is in a state of general prosperity.</p>

PHONOGRAPH PATENT.

CUSHION FOR A SOUND BOX.  
#1,155,945-----H. C. Miller,  
Patented-October 5, 1915.  
Filed-November 9, 1910.

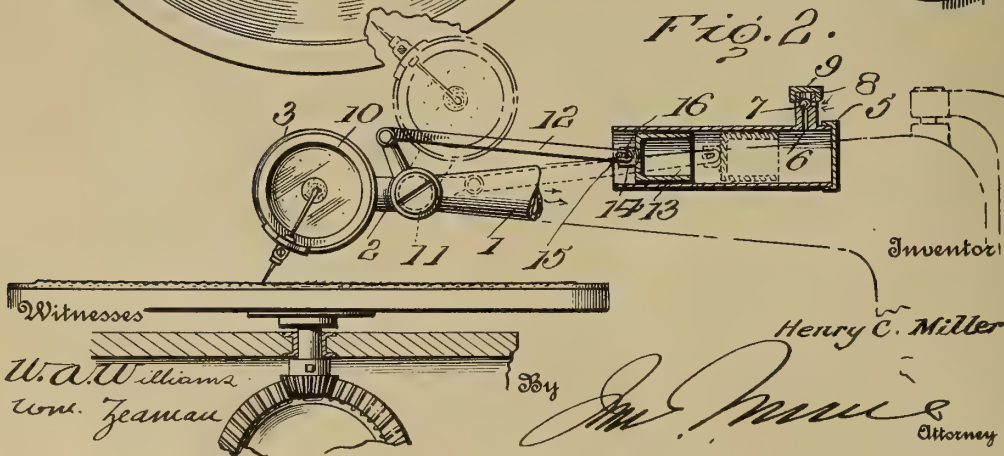
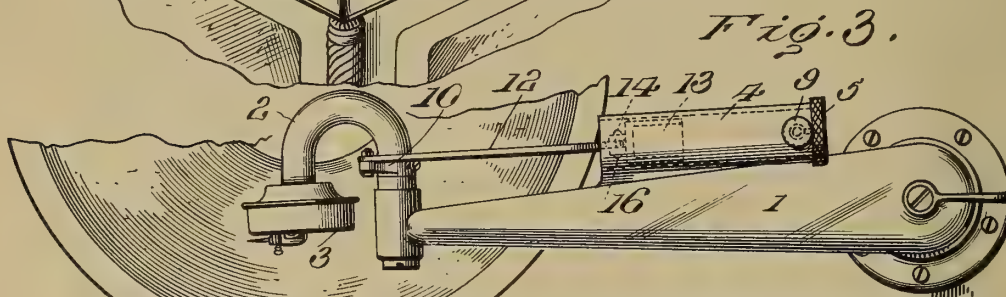
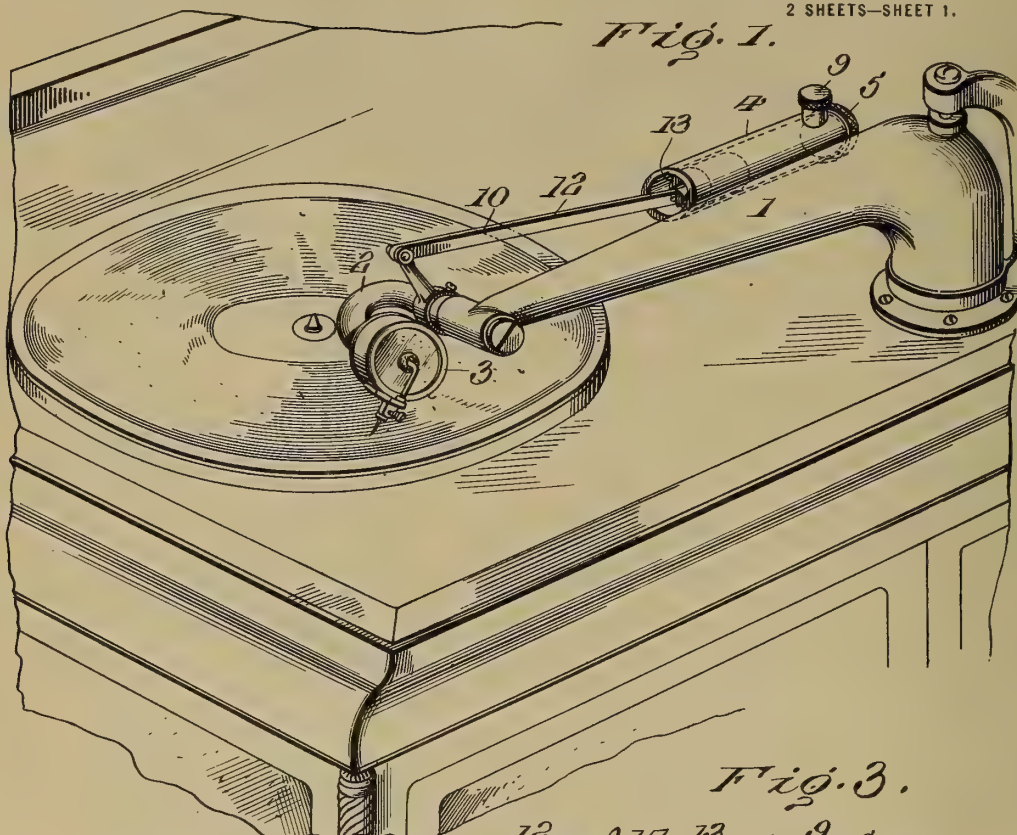


H. C. MILLER.  
CUSHION FOR A SOUND BOX.  
APPLICATION FILED NOV. 9, 1910.

1,155,945.

Patented Oct. 5, 1915.

2 SHEETS—SHEET 1.





H. C. MILLER.  
CUSHION FOR A SOUND BOX.  
APPLICATION FILED NOV. 9, 1910.

1,155,945.

Patented Oct. 5, 1915.

2 SHEETS—SHEET 2.

Fig. 4.

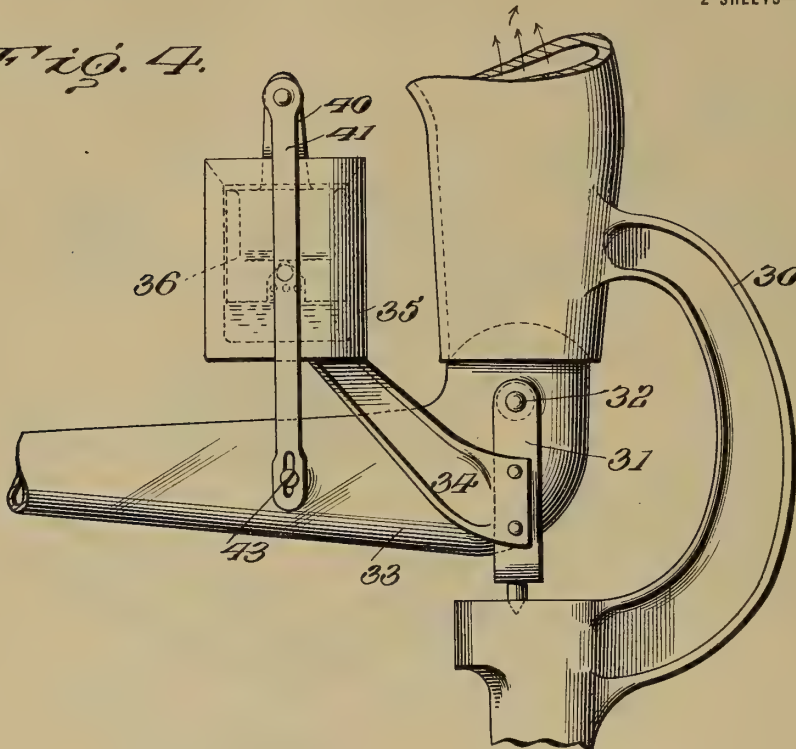
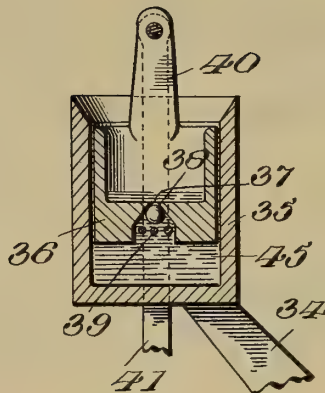


Fig. 5.



Inventor

Henry C. Miller.

Witnesses

W. A. Williams.  
Tom. Zeaman

By *Wm. Miller*  
Attorney



# UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

CUSHION FOR A SOUND-BOX.

1,155,945.

Specification of Letters Patent: Patented Oct. 5, 1915.

Application filed November 9, 1910. Serial No. 591,500.

*To all whom it may concern:*

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Cushions for a Sound-Box; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in devices for preventing a sound box dropping on a record that is being reproduced on a talking machine.

The object of the invention is to provide a pneumatic cushion for a sound conveyer in such manner that when the usual tilting sound box is lowered, it will gradually drop on the record without liability of scratching or otherwise mutilating the grooves.

A further object of the invention is to provide a device which will preclude the accidental falling of the sound box with such force as would mutilate the face of the record.

Other objects and advantages will be hereinafter described and particularly pointed out in the claims.

In the drawings: Figure 1 is a perspective view illustrating the application of my invention. Fig. 2 is a vertical longitudinal section, taken through the cylinder, the sound box being in lowered position in full lines, and in its elevated position in dotted lines. Fig. 3 is a plan view of the cushioning device. Fig. 4 is a detail side elevation of a modified form of the invention. Fig. 5 is an enlarged detail view thereof.

The same numerals refer to like parts in all the figures.

1 indicates a swinging sound conveyer of a sound reproducing machine, 2, the tilting neck, and 3, the sound box. These features form no part of the present invention and they may be of any suitable construction.

Permanently secured on the sound conveyer 2, is a cylinder 4, closed at one end by a screw cap 5, and having a vent opening 6, which communicates with the atmosphere

and which is formed with a valve seat 7. Fitting in the valve seat 7, is a valve 8, the same being retained in position by a cap 9.

Secured to the tilting neck 2, is an arm 10, which may have an opening 11, to engage the neck for convenience in attaching the arm, or it may be secured in position in any desirable manner.

Pivotaly connected to the outer end of the arm 10, is a piston rod 12, which is pivotally connected at its opposite end to a loosely fitting piston 13, in the cylinder 4. The pivotal connection 14 between the piston rod and the piston is so constructed that when the needle is vibrated by the indentations in the record, the movement will not be reflected to the piston.

A slot 15, is formed in the piston rod, and a pin 16, passes through the slot. When the sound box is raised and lowered by the irregularities of the surface of the record, the movement will not be reflected to the weight and friction of the piston. If this was not provided, it is obvious that there would be unnecessary frictional resistance and the record would be subjected to undue wear, and would soon be destroyed.

Assuming the parts are assembled as described and the sound box is in its elevated position, the operation will be as follows. The sound box is tilted on its pivot to bring the needle to the record. As the arm 10 is connected to the neck 2, the piston 13 is drawn forward, and by reason of the loosely fitted piston in the cylinder the air escapes gradually between the piston and the wall of the cylinder thereby dropping the sound box gradually until the needle reaches the record surface. The speed is entirely controlled by fitting the piston more or less tight in the cylinder. Although this is my preferred construction other means may be devised for this purpose. As the valve 7, fits in the seat 8, a partial vacuum is formed in the cylinder when the piston is drawn outwardly. When the sound box is tilted far enough to pass the pivotal connection of the neck, its weight will have a tendency to suddenly pull the piston forward, but the movement is quickly arrested by the partial vacuum, and the descent is very gradual, depending of course upon the amount of air admitted between the cylinder and the loosely fitted piston. The needle carried by



the sound box, contacts with the record so easily as to absolutely prevent marring or destroying the grooves, so that if perchance the sound box were to be accidentally thrown toward the record, the latter would not be indented or otherwise destroyed.

As previously stated, any slight upward movement imparted to the sound box by the record would not be reflected to the piston owing to the disposition of the slot 15 with reference to the pin 16, when the sound box is lowered. In other words, when the sound box is lowered, the rear wall of the groove 15, will be against the pin 14, hence if the record should cause the sound box to be raised slightly such movement will only be reflected to the arm and the piston rod, so that no undue strain will occur on the record.

My invention is simple, and at the same time is positive in operation, and will insure the safety of records against destruction by accidental or careless lowering of the sound box.

This improvement is not necessarily limited to a pneumatic arrangement as described, as it is evident the cylinder may be provided with oil, whereby a cushion effect can be obtained in substantially the same manner. In Figs. 4 and 5 I have illustrated such a construction, the same being applied to a sound conveyer of a different type than that shown in the previous figures. 30 indicates a support to which an amplifier may be secured. To the support is pivoted a yoke 31 having pivots 32, on which the sound conveyer 33, swings. By this construction the sound conveyer and a sound box may be raised and lowered, or horizontally swung. Secured to the yoke 31, is a bracket 34, to which is secured a cylinder 35. In the cylinder is a piston 36, provided in its bottom with an opening 37, in which is seated a ball valve 38, normally held therein by pins 39. Extending upwardly from the piston are arms 40, to which are pivotally connected links 41, the opposite ends of the latter being pivoted to the sound conveyer 33, as indicated at 43. The cylinder holds a supply of oil, indicated at 45. When the sound conveyer is lowered the oil retards the movement and permits the gradual descent of the needle to the record. On the other hand when the sound conveyer is elevated the oil will slowly flow through the opening 37, and consequently act the same as in the previous form of the invention disclosed.

What I claim is:

1. The combination of a pivotally mounted amplifier of a talking machine, a sound box carried by the amplifier, a cylinder movable with the amplifier, a piston in the cylinder, a valve controlling an opening in the cylinder, and a connection between the sound box and the piston, whereby the movement

of the sound box toward a record being reproduced is retarded irrespective of the position of said sound box to the said record.

2. The combination of a movable amplifier of a talking machine, a sound box carried by the movable amplifier, a cylinder movable with the amplifier, a piston in the cylinder, a connection between the sound box and the piston, and means controlled by the movement of the piston to retard the lowering movement of the sound box at any point on the surface of a record being reproduced.

3. The combination of an amplifier of a talking machine, a sound box pivoted to the amplifier, a cylinder, a piston in the cylinder, a connection between the sound box and the piston, means controlled by the movement of the piston to retard the lowering movement of the sound box, and means to prevent minor movements of the sound box moving the piston.

4. In combination, a pivotally mounted sound box movable in two directions, a cylinder movable in one direction with the sound box, a piston in the cylinder, a piston rod pivotally connected to the piston, a valve controlling an opening formed in the cylinder, and a pivotal connection between the opposite end of the piston rod and the sound box, whereby the lowering movement of the sound box will be retarded at any point on the surface of the record being reproduced.

5. In combination, a sound conveyer, a movable sound box pivoted to the movable sound conveyer, a cylinder secured to the sound conveyer and movable therewith, said cylinder having a vent opening, a valve controlling the vent opening, a piston operating in the cylinder, an arm movable with the sound box, and a piston rod connected to the piston and the arm, whereby to retard the lowering movement of the sound box at any point on the surface of a record being reproduced.

6. In combination with a movable sound conveyer and a sound box movable with the sound conveyer, a cylinder carried by said sound conveyer, a valve controlled opening formed in the cylinder, a piston operating in the cylinder, and a connection between the piston and sound box, whereby to retard the lowering movement of the sound box at any point on the surface of a record being reproduced.

7. In combination with a sound conveyer and pivoted sound box, a cylinder, a valve controlled opening in the cylinder, a piston operating in the cylinder, and a connection between the piston and sound box, the said connection having a slot where it is connected to the piston, whereby the movement of the sound box will be retarded, and whereby minor movements of the sound box will not move the piston.

8. In combination with a pivoted sound box, a cylinder, a valve controlled opening

in the cylinder, a piston operating in the cylinder, and a connection between the piston and sound box, said connection having a slot to permit minor movement of the sound box without moving the piston.

9. In combination, a sound conveyer having a sound box, and means including a piston and cylinder for retarding the movement of the sound box, and means for permitting minor movements of the sound box without moving the piston.

10. In combination, a sound conveyer having a pivotally mounted sound box connection, a cylinder formed with a vent opening, a valve controlling the vent opening, a piston fitting loosely in the cylinder, an arm extending from the pivotal sound box connection, a rod pivoted to the arm and the piston, said rod having a slot through which one of the pivotal connections pass, whereby to permit a limited movement of the sound box without moving the piston.

11. The combination of a movable amplifier, a sound box movably connected therewith, a cylinder movable with the amplifier, and means coöperating with the cylinder and the sound box for retarding the lowering movement of the sound box on any point on the surface of a record being reproduced.

12. In a talking machine, the combination of a movable sound conveyer and a sound

box carried thereby, and means including a retarder movable with the sound conveyer and sound box for preventing the sound box suddenly falling at any point on the surface of a record being reproduced.

13. In a talking machine, the combination of a movable sound conveyer and a sound box carried thereby, a cylinder movable with the sound conveyer and sound box, a piston fitting loosely in the cylinder, and a valve in the cylinder closed by the outward movement of the piston to retard the lowering of the sound box, said valve being opened to permit free movement of the piston when the sound box is elevated.

14. In a talking machine, the combination of a sound tube, a sound box mounted to turn on the sound tube, cushioning means between the sound box and the sound tube including a piston to retard the movement of the sound box in one direction, and means to permit a slight movement of the sound box independent of the movement of the piston.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

H. R. VAN KLEECK,  
L. J. SMITH.





# DESIGN.

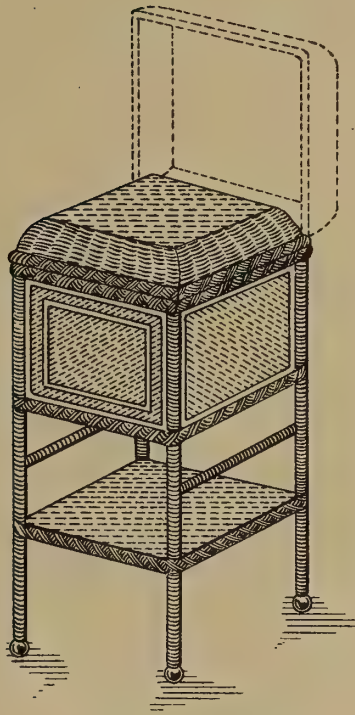
P. DUFFY.

TALKING MACHINE CABINET.

APPLICATION FILED JULY 10, 1915.

47,910.

Patented Oct. 5, 1915.



Witness:

*Thos. E. Stone*

Inventor.

*Peter Duffy.*

By *his* Attorney

*G. M. Reed*





# UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

47,910.

Specification for Design.

Patented Oct. 5, 1915.

Application filed July 10, 1915. Serial No. 39,195. Term of patent  $3\frac{1}{2}$  years.

*To all whom it may concern:*

Be it known that I, PETER DUFFY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The drawing is a perspective view of a

talking machine cabinet showing my new design.

I claim as my invention:

The ornamental design for a talking machine cabinet, as shown.

Signed at New York, in the county of New York and State of New York, this 8th day of July, 1915.

PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# NOTES ON THE HISTORY OF THE

OF THE

OF THE

OF THE

**DESIGN.**

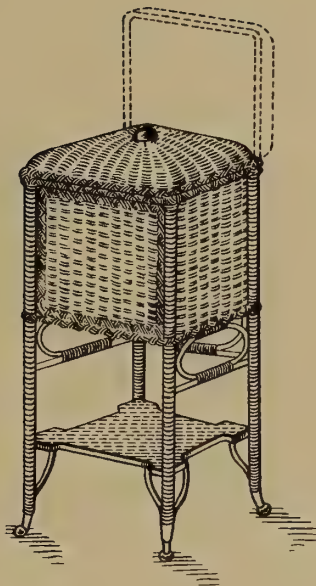
P. DUFFY.

TALKING MACHINE CABINET.

APPLICATION FILED JULY 10, 1915.

47,911.

Patented Oct. 5, 1915.



Witness:-

*Titus Brown*

Inventor.

*Peter Duffy*

By his Attorney

*G. H. [Signature]*





# UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

47,911.

Specification for Design.

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PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# GOVERNMENT OF THE DISTRICT OF COLUMBIA

OFFICE OF THE COMMISSIONER OF THE DISTRICT OF COLUMBIA

DEPARTMENT OF THE DISTRICT OF COLUMBIA

1900

THE DISTRICT OF COLUMBIA

OFFICE OF THE COMMISSIONER OF THE DISTRICT OF COLUMBIA

DEPARTMENT OF THE DISTRICT OF COLUMBIA

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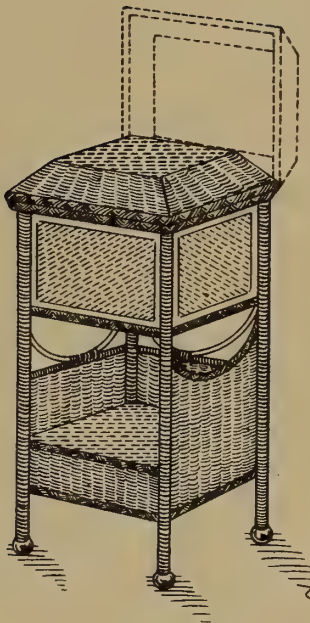
DESIGN.

P. DUFFY.

TALKING MACHINE CABINET.  
APPLICATION FILED JULY 10, 1915.

47,912.

Patented Oct. 5, 1915.



Witness:

*Wm. H. Boone*

Inventor.

Peter Duffy.

By his Attorney

*E. J. H. H. H.*



# UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

47,912.

Specification for Design.

Patented Oct. 5, 1915.

Application filed July 10, 1915. Serial No. 39,197. Term of patent  $3\frac{1}{2}$  years.

*To all whom it may concern:*

Be it known that I, PETER DUFFY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The drawing is a perspective view of a

talking machine cabinet showing my new design.

I claim as my invention:

The ornamental design for a talking machine cabinet, as shown.

Signed at New York, in the county of New York and State of New York, this 8th day of July, 1915.

PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



UNITED STATES PATENT OFFICE

Patent Office of the United States

Department of Commerce

Washington, D.C.

Patent Office

1871

Patent Office of the United States

Patent Office of the United States  
Department of Commerce  
Washington, D.C.  
Patent Office  
1871

Patent Office of the United States  
Department of Commerce  
Washington, D.C.  
Patent Office  
1871

DESIGN.

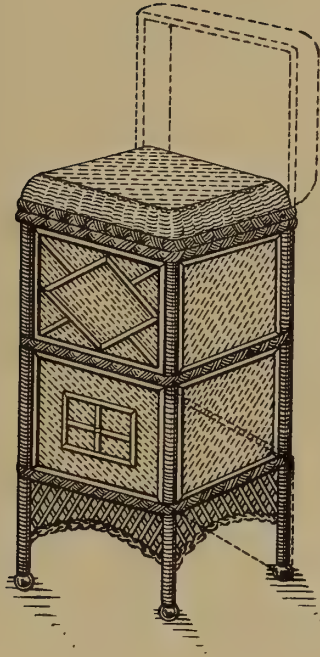
P. DUFFY.

TALKING MACHINE CABINET.

APPLICATION FILED JULY 10, 1915.

47,913.

Patented Oct. 5, 1915.



Witness:-

*Wm. K. Coome*

Inventor.

*Peter Duffy*

By his Attorney

*C. H. Gray*





# UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

47,913.

Specification for Design.

Patented Oct. 5, 1915.

Application filed July 10, 1915. Serial No. 39,198. Term of patent  $3\frac{1}{2}$  years.

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Signed at New York, in the county of New York and State of New York, this 8th day of July, 1915.

PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES OF AMERICA

IN SENATE

January 10, 1900

REPORT

1899

OF THE

COMMISSIONERS OF THE GENERAL LAND OFFICE

IN RESPONSE TO A RESOLUTION

PASSED BY THE SENATE MAY 10, 1898

**DESIGN.**

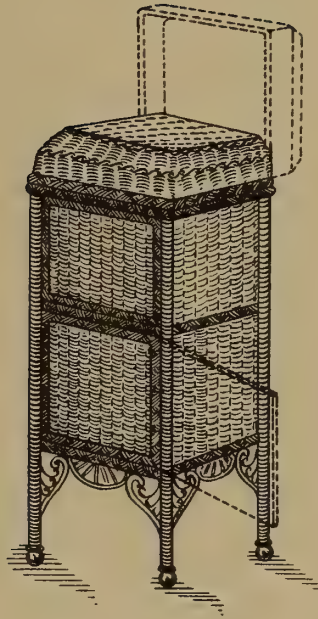
**P. DUFFY.**

**TALKING MACHINE CABINET.**

APPLICATION FILED JULY 10, 1915.

**47,914.**

**Patented Oct. 5, 1915.**



Witness:

*John H. Jones*

Inventor.

By his Attorney *Peter Duffy.*  
*G. H. Jones*





# UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

47,914.

Specification for Design.

Patented Oct. 5, 1915.

Application filed July 10, 1915. Serial No. 39,199. Term of patent  $3\frac{1}{2}$  years.

*To all whom it may concern:*

Be it known that I, PETER DUFFY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The drawing is a perspective view of a

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I claim as my invention:

The ornamental design for a talking machine cabinet, as shown.

Signed at New York, in the county of New York and State of New York, this 8th day of July, 1915.

PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES PATENT OFFICE

OFFICE OF THE COMMISSIONER OF PATENTS

WASHINGTON, D. C.

RECEIVED

NOV 11 1898

TO ALL WHOM THESE PRESENTS SHALL COME, I, ALFRED R. WOODWARD, Commissioner of Patents, send greeting.

Know all men by these presents, that I, ALFRED R. WOODWARD, do hereby certify that the within and foregoing is a true and correct copy of the original of the within and foregoing as the same appears in the files of the Patent Office.

ALFRED R. WOODWARD, Commissioner of Patents.

WITNESSED my hand and the seal of the Patent Office at Washington, D. C., this 11th day of November, 1898.



# DESIGN.

S. H. STIRRUP.

CASING FOR SOUND PRODUCING INSTRUMENTS.

APPLICATION FILED APR. 22, 1915.

47,935.

Patented Oct. 5, 1915.



Inventor

Stanley H. Stirrup

Witnesses

*Henrietta K. Vander Myde*  
*Eeta V. Godwin*

By

*Cyrus W. Rice*

*his Attorney*



# UNITED STATES PATENT OFFICE.

STANLEY H. STIRRUP, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO BERKEY AND GAY  
FURNITURE COMPANY, A CORPORATION OF MICHIGAN.

DESIGN FOR A CASING FOR SOUND-PRODUCING INSTRUMENTS.

47,935.

Specification for Design.

Patented Oct. 5, 1915.

Application filed April 22, 1915. Serial No. 23,243. Term of patent  $3\frac{1}{2}$  years.

*To all whom it may concern:*

Be it known that I, STANLEY H. STIRRUP, a subject of the King of England, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented a new, original, and ornamental Design for Casings for Sound-Producing Instruments, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a casing for sound producing instruments, showing my new design.

I claim:

The ornamental design for a casing for sound producing instruments, as shown.

STANLEY H. STIRRUP.

Witnesses:

CYRUS W. RICE,

JAMES M. PROUDFIT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



# UNITED STATES PATENT OFFICE

INVENTOR: JAMES H. HARRIS, JR., OF NEW YORK, N. Y.

ASSIGNOR: JAMES H. HARRIS, JR., OF NEW YORK, N. Y.

FILED: JAN. 10, 1907

CLASS: 112-100

DESCRIPTION OF THE INVENTION

The present invention relates to a new and improved method of and apparatus for the treatment of the human body, and more particularly to a method and apparatus for the treatment of the human body by means of a vacuum or suction.

The method of the present invention consists in applying a vacuum or suction to the human body, and more particularly to the human face, in order to draw out the impurities from the pores of the skin, and to improve the circulation of the blood.

The apparatus of the present invention consists of a vacuum or suction pump, and a flexible tube or hose, which is adapted to be connected to the human body, and to the vacuum or suction pump.

The method and apparatus of the present invention are particularly adapted for the treatment of the human face, and more particularly for the treatment of the human face by means of a vacuum or suction.

WITNESSES: JAMES H. HARRIS, JR., OF NEW YORK, N. Y.

**DESIGN.**

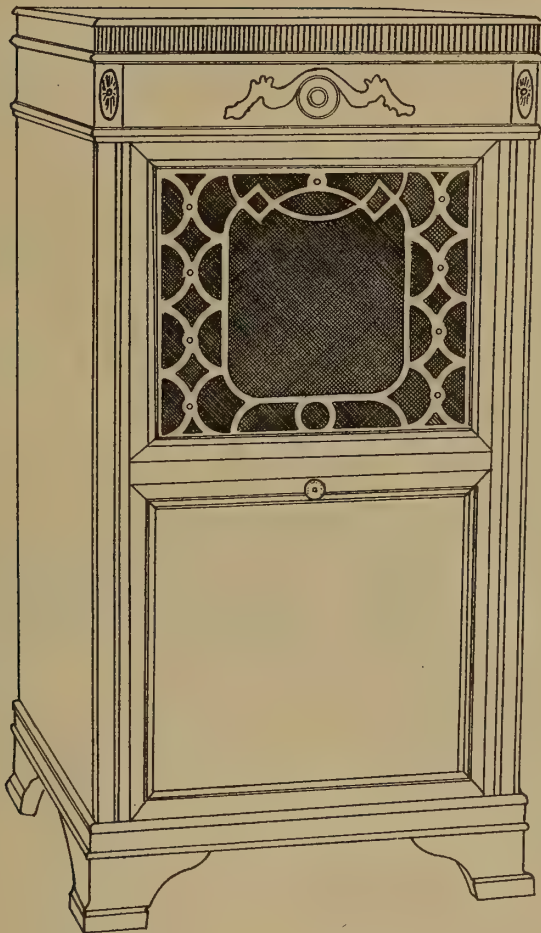
S. H. STIRRUP.

CASING FOR SOUND PRODUCING INSTRUMENTS.

APPLICATION FILED APR. 23, 1915.

**47,936.**

Patented Oct. 5, 1915.



Inventor

Witnesses

*Hemitt K. Vandermyde*

*Beta V. Godwin*

Stanley H. Stirrup

By

*Cyrus W. Rice*

*his Attorney*





# UNITED STATES PATENT OFFICE.

STANLEY H. STIRRUP, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO BERKEY AND GAY FURNITURE COMPANY, A CORPORATION OF MICHIGAN.

DESIGN FOR A CASING FOR SOUND-PRODUCING INSTRUMENTS.

47,936.

Specification for Design.

Patented Oct. 5, 1915.

Application filed April 23, 1915. Serial No. 23,541. Term of patent  $3\frac{1}{2}$  years.

*To all whom it may concern:*

Be it known that I, STANLEY H. STIRRUP, a subject of the King of England, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented a new, original, and ornamental Design for Casings for Sound-Producing Instruments, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a casing for sound producing instruments, showing my new design.

I claim:

The ornamental design for a casing for sound producing instruments, as shown.

STANLEY H. STIRRUP.

Witnesses:

CYRUS W. RICE,  
JAMES M. PROUDFIT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES PATENT OFFICE

Patent Office, Washington, D.C.

Office of the Commissioner of Patents

Division of Patent Examination

Section of Mechanical Engineering

Subsection of Machine Design

Patent No. 1,234,567

Inventor: John Doe

Attorney: Jane Smith

Date of Filing: January 1, 1900

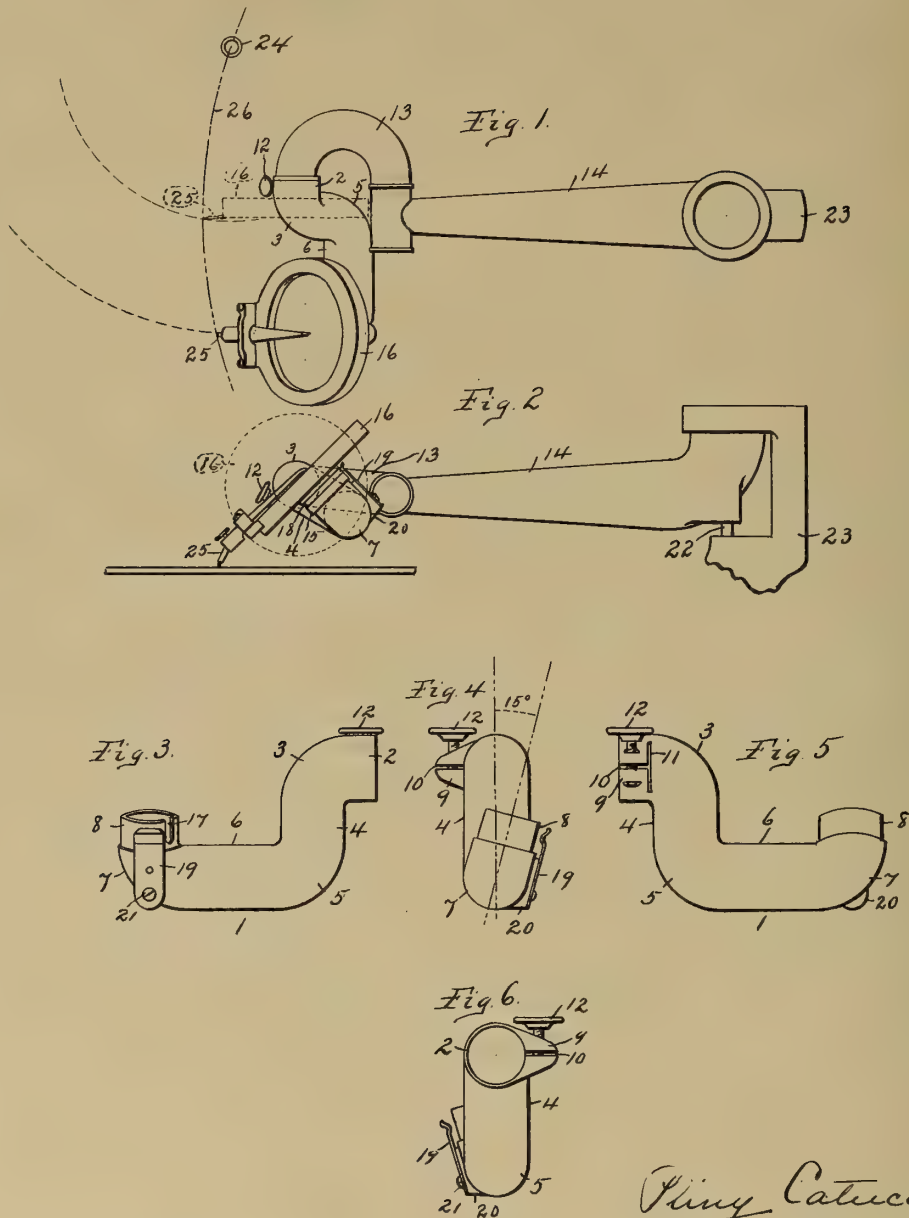
ADAPTER FOR TALKING MACHINES,  
#1,156,130-----P. Catucci,  
Patented-October 12, 1915.  
Filed-Jan . 28, 1914.



P. CATUCCI.  
 ADAPTER FOR TALKING MACHINES.  
 APPLICATION FILED JAN. 28, 1914.

1,156,130.

Patented Oct. 12, 1915.



WITNESSES:

L. Green.  
 Norman E. Zusi

Ping Catucci  
 INVENTOR

BY  
 Louis M. Sanders  
 ATTORNEY

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## ADAPTER FOR TALKING-MACHINES.

1,156,130.

Specification of Letters Patent. Patented Oct. 12, 1915.

Application filed January 28, 1914. Serial No. 814,867.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Adapters for Talking-Machines, of which the following is a specification.

My invention relates to devices for use in connection with one of the well known talking machines now on the market and is designed as an attachment to the tone arm of the machine so as to adapt the sound box for use in playing any kind of disk record now on the market. Such disk records are made in various ways, as for example by the well known Berliner method, whereby the record groove is in the form of a zig-zag spiral groove of uniform depth impressed in the record. The best results with such record are obtained by locating the sound box with its diaphragm in a plane perpendicular to the plane of the record disk, so that the stylus needle may vibrate laterally across the direction of the record groove. Other records made in accordance with the well known Edison method have the sound groove running in a spiral, but the sound waves are formed by a series of successive elevations and excavations within the groove. In this case, the sound box must have its diaphragm located in a plane passing substantially through the center of the record disk, but intersecting said disk at an acute angle.

In order that the stylus needle of the sound box may properly track in the record groove, the parts must be adjusted so that the tone arm, swinging about its center, must carry the point of the stylus in an arc which passes through the center of the rotating disk record. If the stylus point varies materially from this arc, then it is liable to jump out of the groove and race across the face of the disk to the obvious injury of the record and certainly spoiling the rendition of the selection upon it.

It is the purpose of my improvement to provide a connection for the tone arm and

sound box of a talking machine, whereby the same sound box may be utilized for the reproduction of records either of the Berliner type or of the Edison type; that is, the records in which the sound groove is a zig-zag spiral of uniform depth, or where the sound record is made by excavations and elevations.

In carrying out my invention, I make use of the structure substantially as illustrated in the accompanying drawings, wherein—

Figure 1, illustrates a plan view of the tone arm and sound box of a talking machine with my improved adapter in position for playing records of the Edison type, and also in dotted lines, the sound box in position for playing records of the Berliner type. Fig. 2, is a side elevation of the same showing in dotted lines the position occupied by the sound box for the reproduction of records of the Berliner type. Fig. 3, is a top plan view of my improved adapter. Fig. 4, is a right-hand end view. Fig. 5, is a bottom plan view. Fig. 6, is an end plan view showing the means for securing the adapter to the tone arm of the talking machine.

Similar letters of reference refer to like parts throughout the specification and drawings.

My adapter consists of a tubular extension designed for connection directly with the oscillating part of the tone arm of one of the well known talking machines now on the market. It consists of the tube 1, having the short connecting thimble 2, from which extends the elbow 3, the short section 4, followed by the elbow 5 and the extended tubular part 6, having the elbow 7, and the sound box connecting thimble 8. Upon one side of the short connecting thimble 2, I provide a projection 9, integral with the solid body of the thimble, but split as shown at 10, by means of a saw kerf. The projection is also slit away from the body of the thimble at 11. Threaded through the parts of this projection 9, is the thumb screw 12, by means of which the thimble 2, may be contracted and expanded to grip the outer



end of the curved oscillating member 13, of the tone arm 14.

The thimble 8, of the adapter is reduced in diameter slightly to receive the connecting thimble 15, of the sound box 16. The latter may be of any usual or preferred type, and for the purpose of illustration, I have shown the one disclosed in my Patent #1,059,346 of April 22, 1913. The side of the thimble 8, is provided with a slot 17, which is designed to receive a pin (not shown) extending inwardly from the thimble 15, for properly positioning the sound box upon the adapter. The sound box thimble 15, is provided with a circumferential groove 18, to receive the bent end of the holding spring 19, the latter being secured to the elbow 7, of the adapter through the boss 20, and screw 21.

It will be noted that the direction of the axis of the thimble 8, lies slightly out of the main axial plane of the adapter, as clearly illustrated in Fig. 4. The degree of this angularity depends upon the kind of reproducer and stylus to be used, but ordinarily I have found that the angle between the axis of the thimble 8, and the main axial plane of the adapter should be about 15 degrees.

As indicated in Fig. 2, the tone arm 14, is pivoted at 22, upon the supporting arm 23, to swing in the arc of a circle about the pivot 22. The distance between the pivot 22, and the center of rotation 24, of the record disk, should be such that the point of the stylus 25, upon the sound box should swing in the arc 26, of a circle passing through the center 24. If for any reason the stylus falls upon the face of the record at a point materially away from this arc, either one side or the other, the stylus will not properly track as heretofore indicated. It, therefore, has been necessary to provide the adapter with what may be termed "reverse bends", so that in practice the stylus of the sound box attached thereto will swing in the same arc of the circle passing through the center 24, of the rotating disk record, as is the case where the sound box is connected directly to the oscillating member 13, as indicated in Fig. 1.

It will thus be seen that with the use of my improvement upon talking machines of the kind illustrated in the drawings for playing records of the Berliner type, the same sound box may be used for playing records of the so called Edison type. In the first case, the sound box is connected directly to the oscillating member 13, as shown in dotted lines both in Figs. 1 and 2, in which case the point of the stylus 25, swings in the arc 26, passing through the center of rotation 24, of the record. With the adapter in place, the same sound box 16, with the point of its stylus 25, is made to swing in

the same arc 26, passing through the center 24, and the tendency of the stylus to jump from the record groove is obviated.

From a reference to Fig. 2, of the drawing, it will be noted that the general plane of the sound box body 16, coincides substantially with the axis passing through the outer terminus of the oscillating member 13, of the tone arm. In order to accomplish this result, it will be noted that the thimble 8, must be considerably shorter than the tubular part 4, of the adapter so that the open end of the thimble 8 lies outside of what would be the tubular end 2, if the same were rearwardly extended.

I claim:

1. An adapter for talking machines comprising a tubular member having a tone arm clamping thimble at one end and a sound box thimble at its opposite end, said tubular member being reversely bent between its ends to bring the sound box thimble substantially at right angles to, and the extreme end thereof to the rear of the tone arm thimble with the axis of said sound box thimble lying at an angle of substantially 15 degrees with the main axial plane of said tubular member.

2. An adapter for talking machines comprising a rigid tubular member having a clamping thimble at one end for connection to the tone arm of a talking machine, said tubular member being reversely bent between its ends to bring its outer free end substantially at right angles to said clamping thimble with the extreme free end opening to the rear of and toward the extended axis of said clamping thimble.

3. An adapter for talking machines comprising a tubular member having a clamping thimble at one end thereof adapted for securing said member to the oscillating goose neck of a talking machine tone arm, said member being reversely bent to bring its opposite end to the rear of the axis of and at right angles to the clamping thimble with the axis of said opposite end lying at an angle of substantially 15 degrees above the main axial plane of the tubular member.

4. An adapter for talking machines comprising a tubular section having rectangular elbows at each end thereof, the outer ends of said elbows lying at an angle of 15 degrees apart, a second tubular section integral with one of said elbows, and a rectangular elbow and a clamping device upon the free end of said second section, the axis of said last named elbow lying forward of the open end of the elbow at the opposite end.

5. In a device of the class described, the combination of a tone arm pivoted to swing in a horizontal plane, a pivoted goose-neck upon the free end of said tone arm, and a



rigid tubular adapter secured to the free end of said goose-neck, said adapter being reversely bent to bring its free end to the rear of the extended axis of the outer end of said goose neck whereby when a sound box is secured to the free end of said adapter the stylus of said sound box will swing in the arc of a circle passing through

the center of rotation of the talking machine record.

In testimony whereof, I have hereunto set my hand this 23rd day of January, 1914.

PLINY CATUCCI.

In presence of—

NORMAN E. ZUSI,

LOUIS M. SANDERS.

10

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected. The first of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected.

The second of the year was a very wet one, and the crops were much affected. The weather was very cold, and the crops were much affected. The second of the year was a very wet one, and the crops were much affected.

The third of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected. The third of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected. The third of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected.

The fourth of the year was a very wet one, and the crops were much affected. The weather was very cold, and the crops were much affected. The fourth of the year was a very wet one, and the crops were much affected. The weather was very cold, and the crops were much affected. The fourth of the year was a very wet one, and the crops were much affected. The weather was very cold, and the crops were much affected.

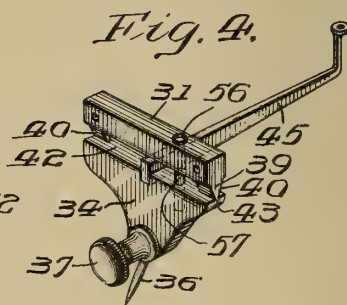
The fifth of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected. The fifth of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected. The fifth of the year was a very dry one, and the crops were much affected. The weather was very hot, and the crops were much affected.

SOUND BOX,  
#1,156,217-----A. C. Diehl,  
Patented-Oct 12, 1915.  
Filed-August 31 1910.



APPLICATION FILED AUG. 31, 1910.

5 SHEETS—SHEET 1.



Grace Pettit.

**ATTORNEY**

F. J. Hartman.  
Clifton C. Hallows

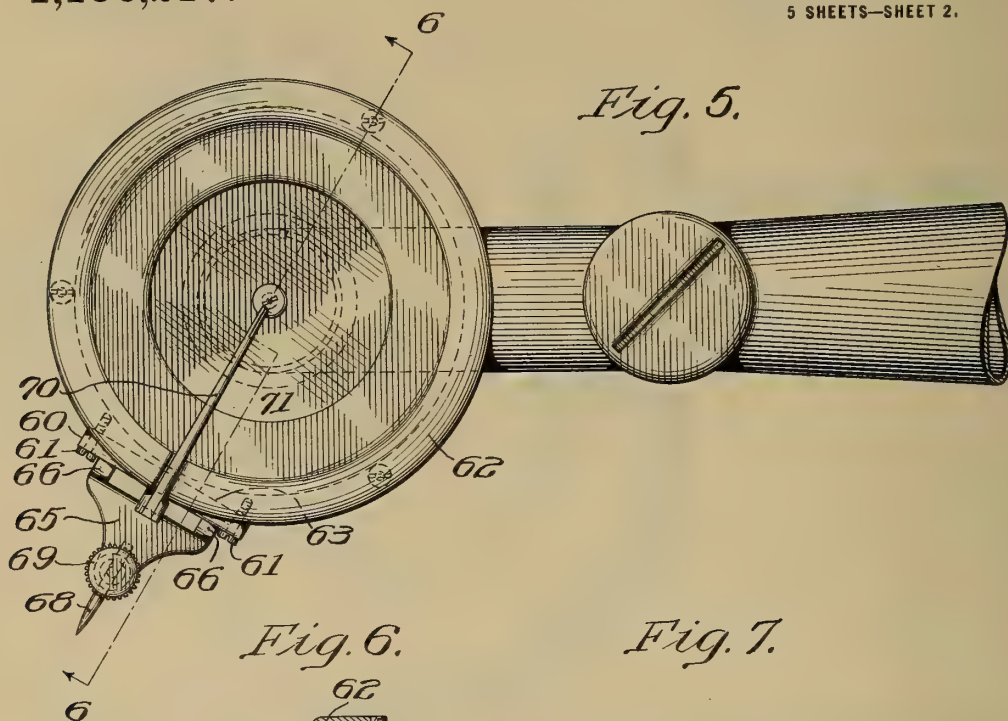
BY



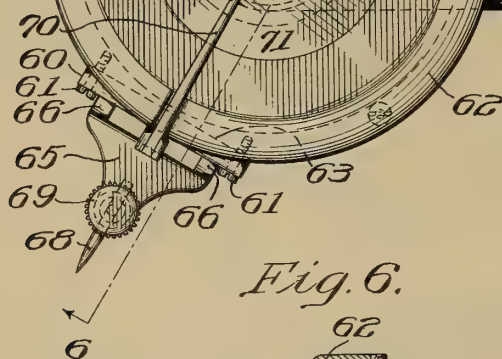
A. C. DIEHL.  
SOUND BOX.  
APPLICATION FILED AUG. 31, 1910.

1,156,217.

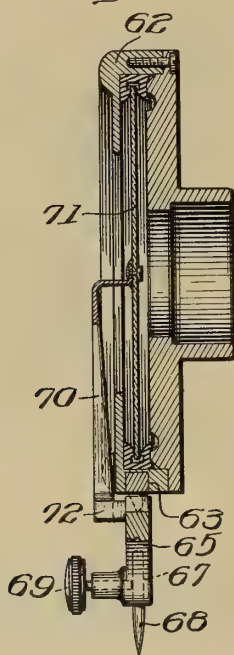
Patented Oct. 12, 1915.  
5 SHEETS—SHEET 2.



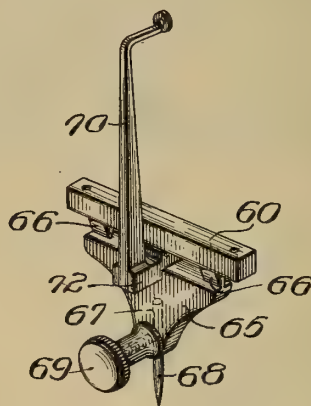
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



WITNESSES

*F. J. Hartman.*  
*Clifton C. Halliwell*

BY

INVENTOR  
*Albert C. Diehl.*  
*Amos Peltz*

ATTORNEY



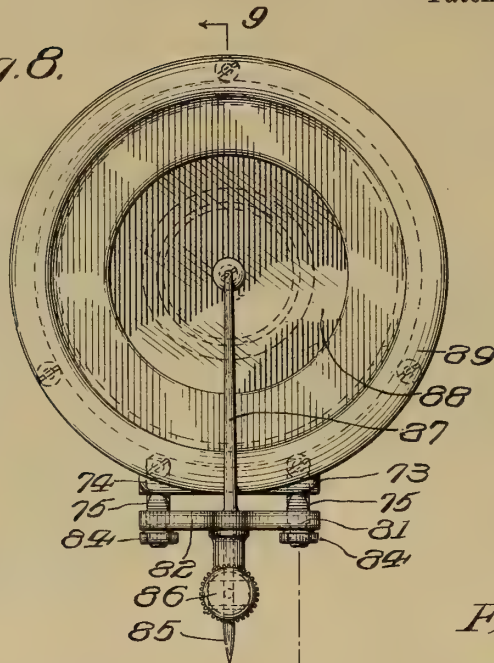


A. C. DIEHL.  
SOUND BOX.  
APPLICATION FILED AUG. 31, 1910.

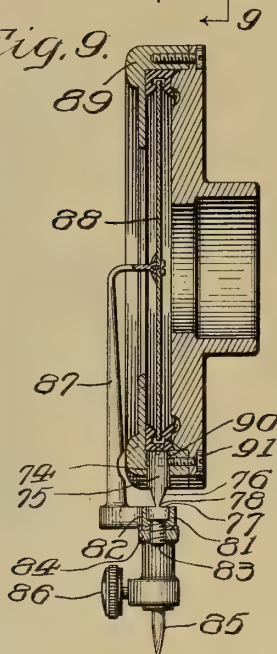
1,156,217.

Patented Oct. 12, 1915.  
5 SHEETS—SHEET 3.

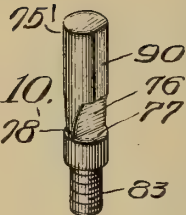
*Fig. 8.*



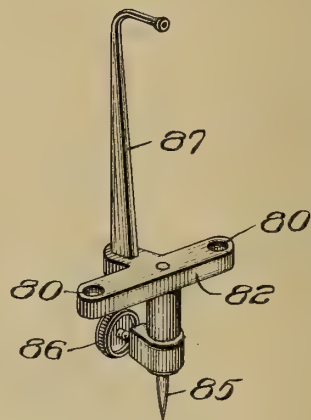
*Fig. 9.*



*Fig. 10.*



*Fig. 11.*



WITNESSES

*F. J. Hartman.*

*Clifton C. Hallowell*

BY

INVENTOR

*Albert C. Diehl.*

*Amos R. Holt*

ATTORNEY





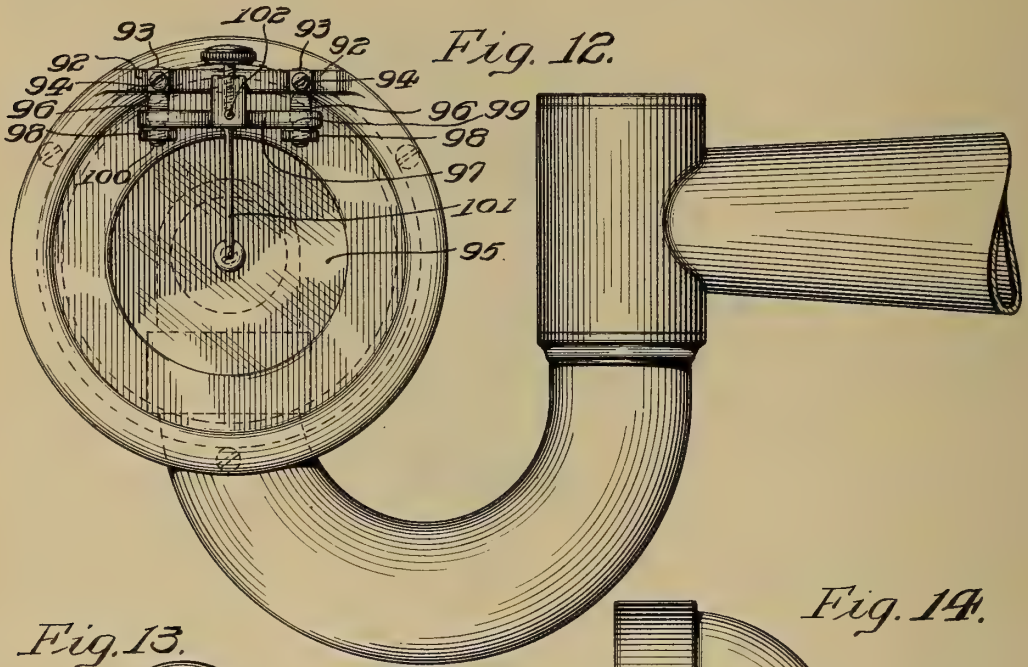
A. C. DIEHL.  
SOUND BOX.

APPLICATION FILED AUG. 31, 1910.

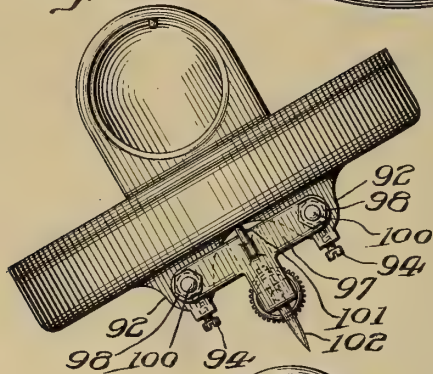
1,156,217.

Patented Oct. 12, 1915.

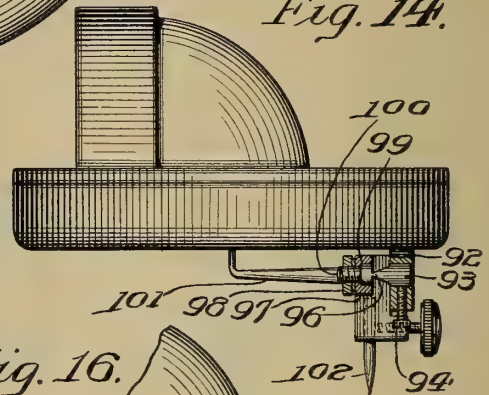
5 SHEETS—SHEET 4.



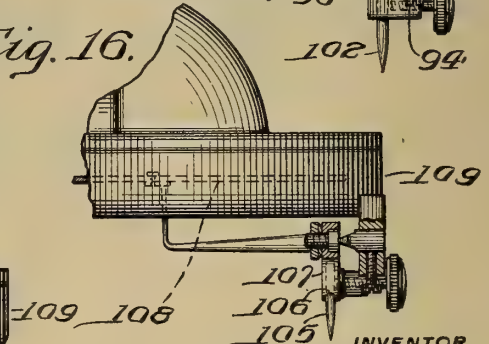
*Fig. 13.*



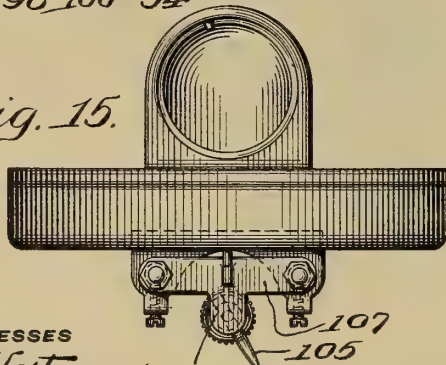
*Fig. 14.*



*Fig. 16.*



*Fig. 15.*



WITNESSES  
H. G. Hartmann. 106  
Clifton C. Halliwell

BY

INVENTOR  
Albert C. Diehl.  
*Albert C. Diehl*

ATTORNEY



A. C. DIEHL.

SOUND BOX.

APPLICATION FILED AUG. 31, 1910.

1,156,217.

Patented Oct. 12, 1915.

5 SHEETS—SHEET 5.

Fig. 17.

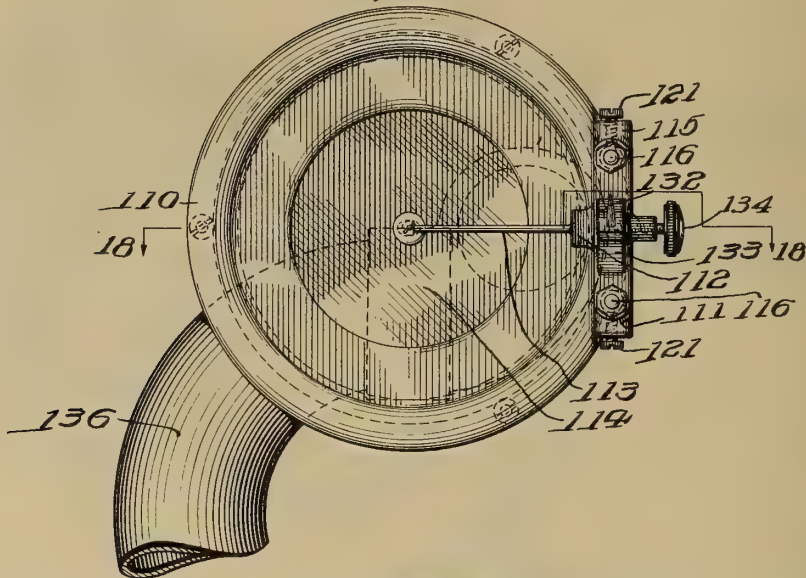


Fig. 18.

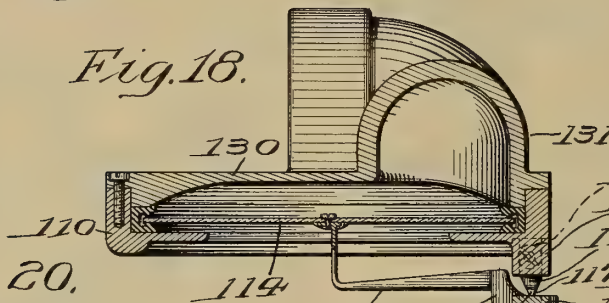


Fig. 20.

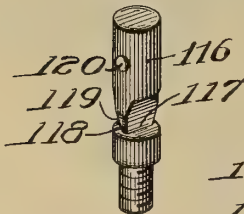


Fig. 21.

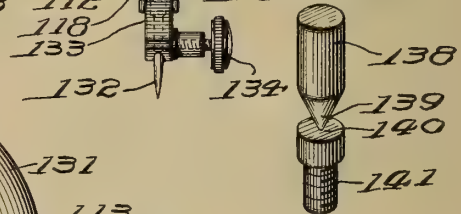
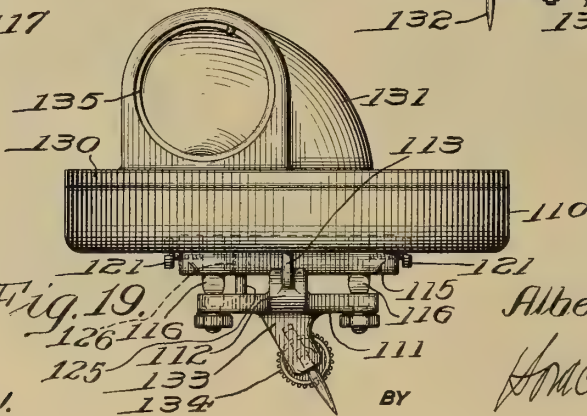


Fig. 19.



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## SOUND-BOX.

1,156,217.

Specification of Letters Patent. Patented Oct. 12, 1915.

Application filed August 31, 1910. Serial No. 579,835.

*To all whom it may concern:*

Be it known that I, ALBERT C. DIEHL, a citizen of the United States; and a resident of Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification, reference being had to the accompanying drawings.

This invention particularly relates to the mounting which supports the stylus needle, and which is connected with the diaphragm by a stylus bar in sound boxes for recording and reproducing machines.

The principal objects of this invention are, to provide a simple and efficient stylus mounting, wherein the number of separable parts is reduced to a minimum; to provide a stylus mounting wherein the axis of oscillation of the vibratory portion is invariable; to provide a stylus mounting with a reduced region which substantially approaches a knife edge, and which supports the vibratory portion of said mounting, independent of other retaining means; to provide a stylus mounting wherein the rigid and vibratory portions are formed of a unitary structure, capable of a limited oscillatory movement; and to provide means to limit the range of oscillation of the vibratory portion of said mounting.

Other objects of this invention are, to mount the sound box in substantially horizontal position to reduce the height of said sound box, and to permit a reduction of the casing in which it is to be inclosed; and to dispose the sound conduit adjacent to the edge of the sound box, local to the needle mounting; to balance the weight of said box on said needle, in a position for the convenient attachment of the gooseneck therewith.

The form of this invention hereinafter described provides a sound box with a stylus mounting connected with the diaphragm of said sound box by a stylus bar and comprising a holder for the stylus needle; a support secured to said sound box casing and connected with the holder by posts which are provided with notches having converging walls approaching substantially a knife edge, to form a thin web, providing a fulcrum; a projection extending between said posts rigidly secured to one part of said mounting and extending adjacent to the other part of said mounting, and arranged

to prevent such relative movement of the parts as would tend to fracture said posts on the fulcrum line of connection between said parts; and provides a mounting, arranged to hold a stylus needle in transverse relation to the plane of the diaphragm.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawings, Figure 1 is an inverted plan view of a horizontal sound box, showing the preferred embodiment of this invention, mounted upon the gooseneck of the swinging arm of a talking machine; Fig. 2 is a side elevational view of said sound box, together with a gooseneck and swinging arm shown in Fig. 1; Fig. 3 is a central vertical sectional view of said sound box, taken on the line 3—3 in Fig. 2; Fig. 4 is a perspective view of the stylus mounting; Fig. 5 is a side elevational view, showing a convenient embodiment of this invention as applied to a sound box having its diaphragm disposed in a vertical plane; Fig. 6 is a central sectional view taken on the line 6—6 in Fig. 5; Fig. 7 is a perspective view of the stylus mounting shown in Figs. 5 and 6; Fig. 8 is a side elevational view of a sound box conveniently embodying a modified form of stylus mounting adapted to a vertically disposed sound box; Fig. 9 is a central sectional view of the sound box shown in Fig. 8, taken on the line 9—9 in said figure; Fig. 10 is a perspective view of one of the flexible posts which connects the needle holder with the mounting support; Fig. 11 is a perspective view of the stylus mounting shown in Figs. 8 and 10; Fig. 12 is an inverted plan view of the horizontal form of sound box embodying the form of flexible connector shown in Fig. 10; Fig. 13 is an elevational view of the sound box shown in Fig. 12; Fig. 14 is a side elevation and partial sectional view of the sound box shown in Figs. 12 and 13; Fig. 15 is a side elevational view showing a sound box and a mounting embodying another form of this invention; Fig. 16 is a fragmentary sectional elevation of the sound box and mounting shown in Fig. 15; Fig. 17 is an inverted plan view of another form of sound box and stylus mounting; Fig. 18 is a sectional view of the sound box shown in Fig. 17, taken on the



line 18--18 in said figure; Fig. 19 is a side elevational view of the sound box shown in Figs. 17 and 18, showing a slightly modified construction of the flexible posts; Fig. 20 is a perspective view of one of the flexible posts shown in Figs. 18 and 19; and Fig. 21 is a modification of the post shown in Fig. 20.

In the embodiment of this invention shown in Figs. 1 to 4, inclusive, the swinging arm 25 carries the pivot barrel 26, which supports the gooseneck 27, upon the free end of which the sound box 28 is removably attached by a bayonet joint connection comprising the slot 29 and the pin 30, in the usual manner. The stylus bar mounting comprises the supporting bar 31, which is secured by the screws 32 to the sound box casing 33, and which has the stylus holder 34 provided with the socket 35 arranged to receive the stylus needle 36, which is secured therein by the thumb-screw 37. Said holder 34 is formed in unitary relation with the supporting bar 31, and is connected therewith by the flexible posts or connectors 39, which, as best shown in the perspective view in Fig. 4, have their opposite sides 40 tapered in planes converging to a shoulder 42, which is preferably coincident with the upper wall of the stylus holder 34 and the sides 40. Said posts 39 approach substantially a knife edge which is joined by a narrow web of material 43 to the holder 34, thus rendering it capable of relative vibratory motion with respect to the posts 39 and supporting bar 31. The holder 34 carries the stylus bar 45, the end of which is supported between the posts or connectors 39 in a plane with the axial line or the fulcrum of oscillation, and extends inwardly, and is engaged with the diaphragm 46. Said diaphragm 46 is disposed within the casing 33 and has its peripheral margin held by the gasket 47, which is provided with a channel 48 forming sharpened shoulders, the edges 49 of which engage the opposite faces of said diaphragm 46, and, as best shown in Fig. 3, a free space surrounds the edge of said diaphragm 46, when pressed against its seat, provided in the casing therefor, as shown in Fig. 4. The diaphragm 46 is held in the casing 33 by the cap plate 50, which is provided with a ridge 51 arranged to engage the side of said gasket 47 in a region disposed between the edges thereof, and said cap plate 50 is engaged with the sound box casing 33 by the screws 52. The cap plate 50 includes the boss 53, which provides the sound conduit 54 and the socket 55 arranged to receive the free end of the gooseneck 27.

It is obvious that the thin web formed by the approaching sides 40 of the posts 39 may be easily fractured by bending the vibratory stylus holder 34 with respect to the

supporting bar 31, beyond the elastic limit of the material of which it is formed, and therefore it is deemed advisable to provide means to prevent such relative movement of the stationary and vibratory parts of the stylus mounting by providing a stud 57, as best shown in Fig. 4. Said stud 57 is secured in the holder 34, and projects upwardly through the aperture 56, which extends through the stylus support 31 and which affords a limited free space surrounding said stud for the normal vibration of said stylus holder. It will be noted that any abnormal distortion of said holder 34 with respect to the supporting bar 31 will be prevented by engagement of the stud 57 with the walls of the aperture 56.

In the form of this invention shown in the figures above described, the stylus needle is disposed in a vertical plane, and in oblique relation to the diaphragm, and the sound box is adapted to be operatively disposed in a horizontal position, whereby the height of the talking machine closure may be reduced.

The form of this invention shown in Figs. 5 to 7, inclusive, is particularly adapted to the vertical type of sound box and comprises the supporting bar 60, which is secured by the screws 61 to the sound box casing 62, which is provided with the slot 63 for the convenient reception of said supporting bar 60. Said bar 60 is in unitary relation with the stylus holder 65 and is connected therewith by the tapered posts 66, and is similar in construction to the form of stylus mounting shown in Figs. 1 to 4, inclusive. Said holder comprises the socket 67 for the stylus needle 68, which is secured therein by the set screw 69. The stylus bar 70 is connected with the diaphragm 71 at one end and is engaged at the other end with the lateral projection 72 which extends outwardly from the stylus holder 65 and is provided with a portion projecting from said holder 65 between the posts 66, and extending adjacent to the supporting bar 60, and in such close relation without touching said bar as to prevent the distortion of the holder 65 with respect to the supporting bar 60 beyond the limit of elasticity of the material of which it is constructed, whereby a fracture of the web of material forming the fulcrum between the stationary bar 60 and the stylus holder 65 is impossible. It will be noted that in the form of mounting shown in Figs. 5 to 7, inclusive, the stylus needle 68 is substantially in the plane of the diaphragm 71.

In the form of this invention shown in Figs. 8 to 11, inclusive, the stylus mounting is formed of separable parts and comprises the supporting bar 73, which is secured in the casing and which is provided with sockets 74 for the flexible posts 75. The



posts 75 are notched upon opposite sides forming oppositely tapered surfaces 76, which terminate in close relation at the shoulder 77 to form a narrow web of material 78, which permits relative vibration of their opposite ends. The lower ends of the posts 75 are fitted in the sockets 80 having ledges 81, in the stylus holder 82, and said posts 75 are provided with the reduced threaded portions 83 in threaded engagement with the nuts 84, which rigidly secure said stylus holder 82 to said posts, with the shoulder formed by said reduced portion in engagement with the ledges 81 in said holder. The stylus holder 82 carries the stylus needle 85, which is secured therein by the set screw 86 and said holder 82 is connected by the stylus bar 87 with the diaphragm 88 within the sound box casing 89. It may be here noted that it is essential that the webs forming the fulcrum of the respective posts be in a common plane, and therefore the post 75, shown in Fig. 10, has the flattened surface 90, for the engagement of the retaining screw 91. It is obvious, however, that said post may be spot-faced, as shown in Fig. 20, which is to be hereinafter described.

In the form of this invention shown in Figs. 12 to 14, inclusive, the sound box is provided with lugs 92, having suitable sockets arranged to receive the flexible posts 93, which are secured therein by the screws 94. Said posts 93 have their axes extending substantially in a plane parallel with the plane of the diaphragm 95, and have their sides notched to form a fulcrum line or web 96, upon which the stylus holder 97 may oscillate; said holder 97 being secured to said posts 93 by the nuts 98, which rigidly secure said holder against the shoulders 99 formed on said posts by the reduced threaded ends 100.

It will be noted that in the construction shown in Figs. 12 to 14, inclusive, the distance between the end of the stylus bar 101, which is connected with the diaphragm 95 and the stylus needle 102, is very materially reduced as compared with the sound boxes above described. Furthermore, as best shown in Fig. 13, the axis of the stylus needle 102 is perpendicular to the plane of the diaphragm 95, and therefore the sound box assumes the inclined position shown in said figure when operatively engaged with a sound record disk.

In the form of this invention shown in Figs. 15 and 16, the stylus needle 105 is disposed in the socket 106 in the stylus holder 107 in an oblique relation to the plane of the diaphragm 108, whereby the sound box 109 is maintained in a horizontal position, as best shown in Fig. 15, when engaged with a sound record disk. In other respects the mounting shown in Figs. 15 and 16 is simi-

lar to the mounting shown in Figs. 12 to 14, inclusive.

The form of this invention shown in Figs. 17 to 20, inclusive, provides a sound box casing 110 with a mounting 111 which is provided with an upwardly and inwardly extending lug 112 supporting the stylus bar 113, which is carried by said mounting 111 and secured to the diaphragm 114. Said mounting 111 is connected with the supporting bar 115 by the flexible posts 116, the axes of which extend in a plane perpendicular to the plane of the diaphragm 114, and said posts 116 are each oppositely notched to form approaching surfaces 117 which form a fulcrum web 118 extending transverse to the stylus bar 113, and said posts 116 are notched to form approaching surfaces 119 in planes in transverse oblique relation to the fulcrum axis. The flexible post 116, shown in Fig. 20, is provided with a spot face 120 for engagement of the retaining screws 121, whereby the alinement of the fulcrum webs of the respective posts when assembled is insured. It has been found that in connecting sound boxes which fit the free end of the gooseneck loosely, the sound box tends to cant, which shifts the stylus needle in oblique relation to a vertical plane which is tangent to the spiral groove of the sound record disk, whereby the needle tends to cut away said groove and to thereby destroy the walls of the record groove. The sound box shown in Figs. 17 to 19, inclusive, is constructed to obviate the above difficulties and includes a backplate 130 comprising a boss 131, having a sound conduit extending therethrough, which is disposed at the edge of said sound box, whereby the weight of said boss 131 is disposed as near as possible over the center of gravity of the stylus needle 132, which is carried by the stylus holder 133 and secured thereto by the set screw 134. The stylus mounting 111 is prevented from rocking beyond a predetermined limit by the stud 125, which is secured in the vibratory member of said mounting and projects loosely into the aperture 126 in the stationary member, similar to the stud 57 shown in Figs. 1 to 4, inclusive. As best shown in Fig. 17, the boss 131 is curved substantially eccentric with the edge of the plate 130 and is provided with the socket 135, which is disposed adjacent to the edge of the sound box so as to permit the convenient attachment of the gooseneck 136.

In the form of this invention shown in Fig. 21, the flexible post 138 has a conical waist portion 139 terminating in the shoulder 140, and is provided with the threaded reduced portion 141 for its convenient attachment to a stylus holder.

It has been found that the best results have been achieved by increasing the space



between the diaphragm and the inner wall of the sound box casing toward the center or toward the region of the diaphragm which has the greatest freedom of vibration, and, therefore, as shown in Fig. 3, the inner surface of the plate 50 has substantially conical depression, and, as shown in Fig. 18, the plate 130 is dished.

It may be here noted that the form of stylus mounting herein set forth is an improvement over the form of stylus mounting wherein the separate members, one providing a flat surface against which the knife edge of the other bears, are adapted to be held by separate spring members, which spring members are liable to permit a slight relative movement of the knife edge upon its supporting surface, which effects a wearing away of the said knife edge and the contiguous bearing surface; it is obvious that no relative displacement of the stationary and vibratory members is possible, and that any wear consequent upon relative movement of the members is impossible in the structure herein shown.

It may be observed that the spring members necessary to hold together the separate parts of mounting heretofore constructed are eliminated by the integral construction herein shown.

Although the preferred embodiment of this invention provides a flexible post which is oppositely tapered upon but two sides, and provides a line of material substantially approaching a knife edge, upon which the stylus holder is fulcrumed, it may be noted that in view of the forms shown in Figs. 20 and 21, other forms of flexible posts may be suggested which will obviously fall within the scope of this invention, and for this reason it is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A stylus mounting formed of a unitary piece of material having a central aperture forming spaced posts, the opposite sides of which are provided with recesses having sloping walls which approach substantially a knife edge and form a flexible web connection of negligible thickness between the parts of said mounting which are disposed upon the opposite sides thereof.

2. A stylus mounting comprising stationary and vibratory portions, formed of a unitary piece of material and provided with a central aperture forming spaced posts connecting the stationary portion of said mounting with the vibratory portion of said mounting, and having notches disposed in

the opposite sides of said posts, and providing gradually converging walls which approach substantially a knife edge, and which abruptly diverge therefrom to provide a fulcrum the axis of oscillation of which is invariable.

3. A stylus mounting comprising a stationary support, and a relatively vibratory needle holder joined in unitary relation therewith by flexible connectors having angular notches forming shoulders, and providing reduced regions adjacent to said shoulders which form a fulcrum the axis of oscillation of which is invariable.

4. A stylus mounting comprising a unitary structure forming a needle holder and a stationary support joined by a flexible connection having opposed notches, the angles of which provide a fulcrum forming an axis of oscillation which is invariable, and means to prevent the oscillation of said needle holder beyond a predetermined limit.

5. A stylus mounting comprising a unitary structure forming a needle holder and a stationary support joined by a flexible connection having angular recesses, the opposed angles of which provide a fulcrum the axis of oscillation of which is invariable, and means carried by one of said members and extending in close proximity to the other of said members, operative to prevent relative distortion of said members beyond a predetermined range of movement.

6. A stylus bar mounting comprising a needle holder and a stationary support joined by a flexible connection having angular notches, the opposed angles of which provide a fixed fulcrum for the relative oscillation of said holder and its support, and a projection on said holder extending in spaced relation to said support, arranged to engage said support to prevent distortion of said needle holder beyond a predetermined range of movement.

7. A stylus mounting comprising a stationary support and a needle holder joined thereto by flexible connectors having recesses forming reduced regions which provide an invariable fulcrum axis for the relative oscillation of said needle holder and stationary support, and a projection carried by said holder extending in spaced relation in close proximity to said support, and arranged to engage said support to prevent said holder from being distorted with respect thereto beyond its limit of elasticity.

8. A stylus mounting comprising a stationary support, and a needle holder joined therewith by a flexible connector having opposed converging walls, approaching substantially a knife edge, and abruptly diverging therefrom to form angles which provide a fulcrum the axis of oscillation of which is invariable.

9. A stylus mounting formed of a unitary piece of substantially inflexible material having an aperture forming spaced posts, the opposite sides of which are provided with recesses having sloping walls which approach substantially a knife edge to form a flexible connection between the parts of said mounting which are disposed upon the opposite sides thereof.

10. A stylus mounting comprising a stationary portion and a vibratory portion, formed of a unitary piece of material and provided with an aperture forming spaced posts connecting the stationary portion of said mounting with the vibratory portion, and having notches in said posts forming walls which substantially approach a knife edge and which abruptly diverge therefrom to provide a fulcrum, whose axis of oscillation is invariable.

11. A stylus mounting, comprising a stationary support, and a needle holder joined thereto by flexible connectors having reduced regions which provide a fulcrum for the relative oscillation of said needle holder and its support and having a projection extending from said holder in close proximity to said support and arranged to prevent said holder being distorted from a predetermined range of movement.

12. The combination with a relatively stationary support, of a comparatively rigid needle holder, and a connector joining said support and said holder and forming therewith a unitary structure, said connector having opposed converging walls approaching and almost meeting in an imaginary knife edge, and said structure having walls diverging abruptly from said first-mentioned walls, forming oppositely disposed substan-

tially sharp corners therewith, and providing a flexible region in said connector between said corners, whereby said stylus holder is mounted to oscillate upon a substantially invariable axis approximately coincident with said imaginary knife edge.

13. The combination with a relatively stationary support, of a stylus holder spaced therefrom, and spaced connectors joining said support and said holder and forming therewith a unitary structure, each of said connectors having opposed converging walls approaching and nearly meeting in an imaginary knife edge, and said structure having walls diverging abruptly from said first mentioned walls of each of said connectors and forming therewith comparatively sharp corners providing flexible regions in said connectors between said corners and whereby said stylus holder is mounted to oscillate upon a substantially invariable axis approximately coincident with said imaginary knife edge.

14. A stylus mounting comprising a relatively stationary support, a stylus holder, and flexible means connecting said holder to said support, said flexible means having opposed converging walls approaching a knife edge and said mounting including walls diverging abruptly from said knife edge to form with said converging walls, angles which provide a fulcrum of oscillation which is substantially invariable.

In witness whereof, I have hereunto set my hand this 29th day of August, A. D., 1910.

ALBERT C. DIEHL.

Witnesses:

FRANK B. MIDDLETON, Jr.,

CHARLES F. WILLARD.







PHONOGRAPH,  
# 1,156,931-----C. B. Repp,  
Patented-October 19th, 1915,  
Filed-March 13th, 1913.

1,156,931.

Patented Oct. 19, 1915.  
 2 SHEETS—SHEET 1.

Fig. 1.

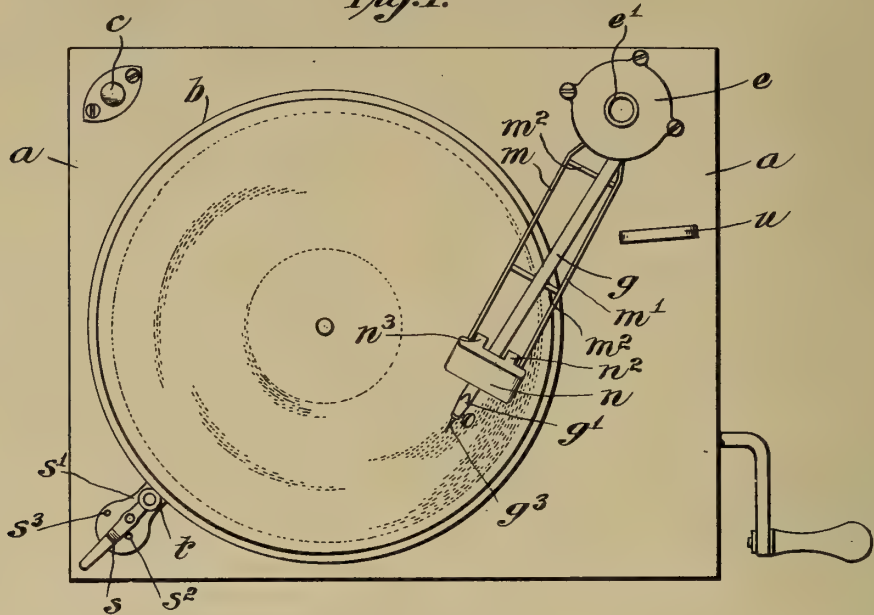
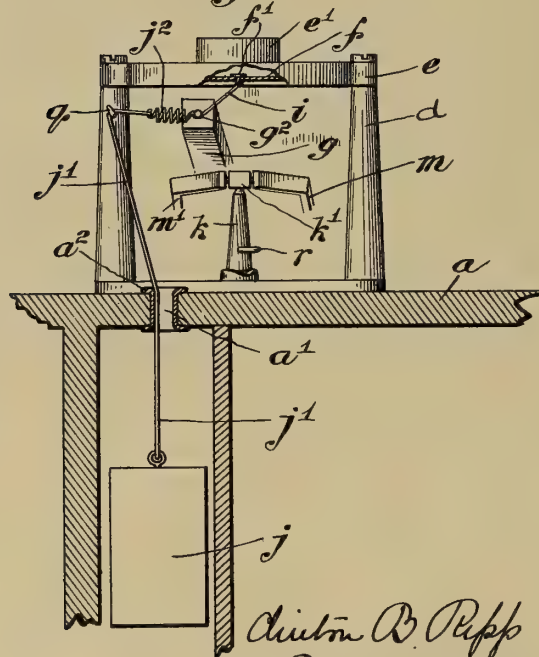


Fig. 2.



Attest:  
*E. M. Mitchell*  
*Eugene W. Wining*

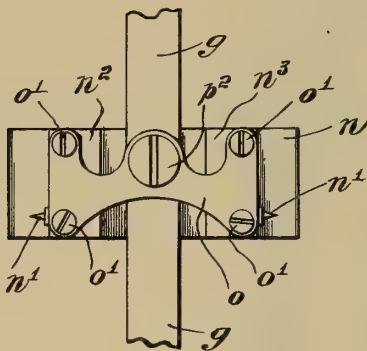
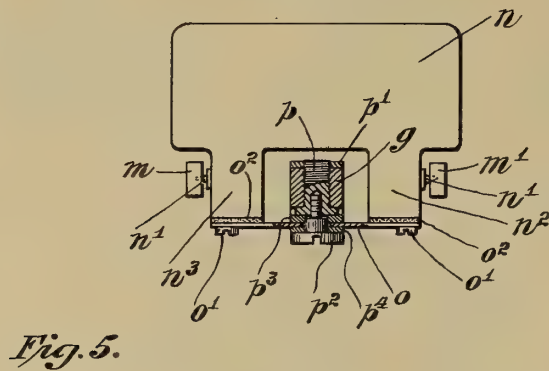
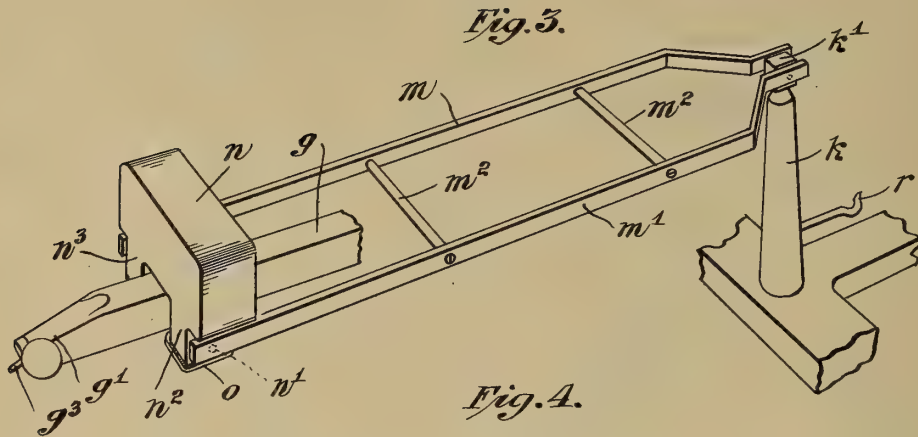
*Clinton B. Repp* Inventor:  
 by *Frank J. Wentworth*  
 his Atty.





1,156,931.

Patented Oct. 19, 1915.  
 2 SHEETS—SHEET 2.



Attest:  
*Eugene W. Wining.*

*Clifton B. Repp* Inventor:  
 by *Frank J. Wentworth*  
 his Atty.

# UNITED STATES PATENT OFFICE.

CLINTON B. REPP, OF PLAINFIELD, NEW JERSEY.

## PHONOGRAPH.

1,156,931.

Specification of Letters Patent.

Patented Oct. 19, 1915.

Application filed March 15, 1913. Serial No. 754,445.

*To all whom it may concern:*

Be it known that I, CLINTON B. REPP, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to phonographs, and more particularly to a type thereof wherein sound vibrations are transmitted to a diaphragm through a vibrant transmitter arm. The main object of the invention is to provide a phonograph of this type wherein the end of the transmitter arm adjacent to the needle or stylus will be supported in a manner to develop the requisite pressure of the needle or stylus upon the record, while at the same time minimizing or preventing the development of vibrations in the supporting means for, or the transmission of vibrations through said means from, the transmitter arm.

A further object is to connect the transmitter arm with the supporting means in a manner to permit the adjustment of the machine for use with different styles of records, such as vertical cut with V-shaped bottom, or cupped bottom, lateral cut, or combined lateral and vertical cut.

A still further object is to provide a phonograph of this type wherein a vibration absorbent body is arranged between the transmitter arm and the supporting arm therefor, said means being connected to the transmitter arm in a manner to minimize the tendency of vibrations to pass from said arm to said vibration absorbent body.

A still further object is to provide a phonograph of this character wherein the various supporting means for the transmitter arm and the supporting arm therefor will be so constructed as to afford no loose parts which, by rattling, will have a tendency to develop cross vibrations or overtones resulting in blasts or interference with the tone quality of the sound reproduction. And a still further object is to provide in a phonograph of this character, means whereby the direction of the tensioning stress upon the diaphragm may be controlled to secure a more perfect reproduction with the verti-

cal cut, or combined vertical and lateral cut records.

The invention consists primarily in a phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are conveyed to said diaphragm, tensioning means for the diaphragm, a pivotal weighted supporting arm, and connections between said supporting arm and said transmitter arm embodying therein a non-vibrant weighted body of a mass sufficient to absorb vibrations passing thereto; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—Figure 1 is a plan view of a phonograph embodying my invention, with the amplifier removed therefrom; Fig. 2 is a back view of the sound box and transmission mechanism; Fig. 3 is a perspective view of the transmitter arm supporting means, the outer portion of the transmitter arm being shown in connection therewith; Fig. 4 is a front view of the connecting means between the transmitter arm and its supporting means, the transmitter arm and side bars of the supporting frame being shown in cross section; Fig. 5 is a bottom view of the vibration absorbent body and the flexible connection between same and the transmitter arm, a portion of said transmitter arm being shown; and Fig. 6 is a detail view of the stopping lever.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, *a* indicates an ordinary cabinet having mounted thereon a rotary table *b* actuated by a motor, not shown, the governor controlling screw being shown at *c*. Mounted upon the cabinet *a* radially of the table *b* is a sound box supporting frame *d* upon which the sound box *e* is mounted.

The sound box *e* is provided with a sound outlet nipple *e'*, to which the horn or other means through which the sound waves are conveyed is attached. Mounted in said sound box is an ordinary flexible diaphragm *f*, in which vibrations are developed for producing the desired sound waves. Projecting over the table *b* is a vibrant transmitter arm *g*, which preferably is composed



of wood, one end of said arm being provided with a mount or set  $g'$  for the reproducing needle or stylus, and the other end thereof carrying a stud  $g^2$ .

5 The transmitter arm  $g$  is in connection with the diaphragm  $f$  through a short link connection  $i$ , preferably composed of a flexible strand of waxed silk or linen, cat-gut or other suitable material, one end of which is  
10 passed over the stud  $g^2$  and the other end of which passes through an eye in a stud  $f'$  carried by the diaphragm  $f$ .

To place the diaphragm under constant uniform tension, through said arm  $g$  and  
15 said connecting link  $i$ , I provide a weight  $j$  connected to the stud  $g^2$  by a flexible strand  $j'$ , said weight  $j$  being located within the cabinet  $a$  and said cord passing through an opening  $a'$  in said cabinet, protected by a  
20 bushing  $a^2$  to prevent abrasion of said strand  $j'$ . The said strand  $j'$  may have in its length a short spring  $j^2$  to prevent retardation of the diaphragm during high frequency vibrations. Under most conditions,  
25 the spring  $j^2$  will not be necessary, but in almost all records there are apt to be parts where the use of such a spring would be desirable.

The transmitter arm  $g$  being adapted to  
30 be propelled across the record by and in accordance with the indicated sound waves thereon, and it being necessary to develop sufficient pressure upon the arm adjacent to the mount or set  $g'$  to insure the requisite  
35 intimate engagement of the reproducing stylus or needle with the record, I provide supporting means for the transmitter arm  $g$ , connected therewith adjacent the end thereof carrying the reproducing stylus or needle  
40 mount or set, which means guides said transmitter arm in its movement across the record and through which the requisite downward pressure is exerted upon said transmitter arm.

45 It is not my intention to claim the structure herein described broadly in this application, the invention herein set forth being directed more particularly to details by which the tone quality of the phonograph  
50 is made more uniform, and purity of tone is secured irrespective of the pitch of different notes occurring in a record.

I have found by actual experiment and use that with notes of high pitch if prolonged, there has been a tendency to develop  
55 sound vibrations in the supporting arm, and that with continued use, pintle screws or other forms of bearings develop slight lost motion, causing at times a rattling in the various connections which in turn will develop cross vibrations and thus affect adversely, the purity or quality of the tone reproduction.

60 I have heretofore insulated the transmitter arm from the supporting arm by means

of ordinary insulating gaskets, but these have not proven to be satisfactory under all conditions of, and after continued, use.

To prevent the development of vibrations in the supporting arm or the transmission  
70 of vibrations from the transmitter arm to said supporting arm, and at the same time develop the requisite pressure of the reproducing stylus or needle upon the record, and prevent rattling in the various connections and supporting means, I provide a special construction of supporting arm and a special form of connecting means between  
75 same and the transmitter arm, which connecting means will be substantially non-vibratory, or such as to absorb any vibrations passing thereto from said arm.

Mounted axially below the diaphragm  $f$  is a post  $k$  having mounted in the top thereof upon a vertical axis a pivotal block  $k'$ .  
80 Mounted upon said block by means of horizontal pivots is the supporting arm which preferably consists of parallel side bars  $m$   $m'$  of stiff resilient stock, which bars are preferably spaced apart by the tie rods  $m^2$   
90 intermediate the ends thereof. This construction affords an arm substantially rigid intermediate the ends thereof, which ends are forked or substantially forked so as to embrace the block  $k'$  and the connecting  
95 means between said arm and the transmitter arm  $g$ . The block  $k$  and the forked end of the supporting arm adjacent thereto are provided with cooperating pintle bearings and sockets, the resiliency inherent to the  
100 arms  $m$   $m'$  forming a sufficiently tight bearing, and automatically taking up any wear, so as to prevent rattling at this point.

Mounted between the outer ends of the arms  $m$   $m'$  or in the fork formed by said  
105 outer ends, is a weighted block  $n$  of a mass sufficient to prevent this block responding to ordinary vibrations or to cause the block to absorb any vibrations which may pass thereto. This block  $n$  is also of a weight  
110 sufficient to develop the desired pressure of the reproducing stylus or needle indicated at  $g^3$  in the drawings, upon the record.

To avoid rattling in the connection between the non-vibratory block or member  $n$   
115 and the supporting arm, while at the same time to permit relative movement of these parts, I provide them with cooperating pintle bearings and sockets  $n'$  adapted to be assembled by springing the arms  $m$   $m'$   
120 outwardly and permitting them to seat under the resiliency or elasticity inherent to said arms. This construction prevents rattling of the connection, affords the necessary freedom of movement of the non-vibratory  
125 or vibration absorbent weighted block and the supporting member, and forms a part of the universally movable supporting connection between the supporting arm and the transmitter arm  $g$ .



I have found in actual practice that I secure the best results by arranging the bearing between the block  $n$  and the supporting arm at a point of said block forwardly of the vertical axis thereof, or toward the mount or set  $g'$ . By means of this block, I am enabled to dispense with all springs acting upon the supporting arm and thus eliminate possibility of the development of vibration by reason of the presence of such a spring or springs.

In adjusting the machine for use upon different styles of records, it is necessary to vary the angle of projection of the transmitter arm relative to the supporting arm to permit which action I use a universal joint between these two arms. To permit such adjustment in this machine, I connect the transmitter arm  $g$  with the block  $n$  by means of a vertical pivot, or one extending at right angles to the axis of the pivots  $n'$ , connecting said block with the supporting arm, providing in connection therewith, means permitting free vibration of the arm  $g$  in a manner which will minimize or prevent the transmission of such vibrations to the block  $n$ .

To facilitate the connection of the transmitter arm  $g$  with the block  $n$  and through said block with the arms  $m$   $m'$ , I form said block  $n$  with the pendant lugs  $n^2$   $n^3$  between which the arm  $g$  is adapted to pass without engaging said block. Closing the space between these lugs is a spring plate  $o$ , the ends of which are firmly attached to the bottoms of said lugs  $n^2$   $n^3$  by means of the screws  $o'$ , or in any other desired manner, flexible gaskets  $o^2$  being interposed between said plate and said lugs. Intermediate the lugs  $n^2$   $n^3$ , the plate  $o$  is reduced as shown to impart the desired flexibility thereto, and centrally thereof this plate is extended as shown to form a bearing for the pivot connecting said arm  $g$  therewith.

To avoid looseness of the connection between the plate  $o$  and the arm  $g$ , I provide said arm with a headed metallic screw stud  $p$  embedded in the material of the arm and clamped in place by means of a nut  $p'$ . This stud is drilled axially thereof and a shouldered screw  $p^2$  is passed through the opening in the extended portion of the plate  $o$ , the hole in the opening in the stud  $p$  being interiorly screw threaded to cooperate with said screw. A gasket  $p^3$  is inserted between the plate  $o$  and the head of the stud  $p$ , and a second gasket  $p^4$  is inserted between the head of the screw  $p^2$  and said plate  $o$ . By this construction the arm  $g$  is firmly attached to the plate  $o$ , the flexibility of which will avoid any dampening effect upon this arm. The arrangement of gaskets  $p^3$  and  $p^4$  will act as absorbers or insulators as to vibrations which may be developed in the plate  $o$ , and thus cooperate with the

gaskets  $o^2$  in excluding vibrations from the weighted block  $n$ .

One of the standards of the frame  $d$  has a projecting loop or hook  $q$  arranged to one side, or radially, of and below the diaphragm  $f$ , and the post  $k$  carries a second loop or hook  $r$ , axially below the diaphragm, the bushing  $a^2$  being disposed intermediate said loops or hooks.

By this construction, a stress directly axially of the diaphragm, or a stress substantially radially thereof, or a stress intermediate these two points, may be applied thereto, thus affording three adjustments so as to adapt the machine for use upon vertical cut, lateral cut, or combined vertical and lateral cut records.

The loop or hook  $q$  being disposed below the plane of the diaphragm, the stress will have a downward component thus merely approximating a radial stress. Whatever the adjustment, the tension upon the diaphragm will be substantially the same.

The table  $b$  is provided with a pendant rim  $b'$ , (see Fig. 6) which is adapted to be engaged by a friction brake used in starting and stopping the machine. Heretofore spring pressed brakes have been used, but I have found that the sudden stoppage resulting from the practically instantaneous application of the braking power tends to rack the governor mechanism. To obviate this difficulty, I employ a brake mechanism comprising a lever  $s$  mounted upon a plate  $s'$  carried by the cabinet  $a$  which lever plays between the stops  $s^2$  and  $s^3$  upon said plate. One end of said lever constitutes an operating handle and the other end thereof has mounted thereon, upon an axis parallel with the axis of the table  $b$ , a roller having a friction surface adapted to be brought into engagement with the rim  $b'$  of the table  $b$ .

The radius of the arm of the lever  $s$  carrying the roller  $t$  is of a length to cause said roller to be forced into the desired frictional contact with the said rim  $b'$  through the power of the main spring of the motor driving the table  $b$ . By this construction, when the brake is set, the roller  $t$  will rotate upon contacting with the said rim  $b'$  for a sufficient time to cause a gradual stopping of the table  $b$  and thus relieve the governor from the racking strains above referred to.

At  $u$  I have shown a rest adapted to hold the supporting arm when the reproducing stylus or needle is out of engagement with the record. This support is arranged adjacent the frame  $d$  and on a radius of the diaphragm  $f$  which would carry the mount or set  $g'$  free of the record. This rest is used to facilitate the removal and insertion of the reproducing stylus in the said mount or set.

The operation of the herein described phonograph is substantially as follows:—



When the reproducing stylus or needle  $g^3$  is brought into engagement with a record, the sound vibrations indicated upon a record are transmitted through the arm  $g$ , and loop  $i$  to the diaphragm in the usual manner.

When lateral cut records are used, the strand  $j'$  is passed over the loop or hook  $q$ ; when vertical cut records are used it is passed beneath the loop or hook  $r$ ; and when a combined vertical and lateral cut record is used it is allowed to hang directly through the opening  $a'$ . Each adjustment of the strand  $j'$  will shift that end of the arm  $g$  which is adjacent to the diaphragm  $f$ , the other end thereof having movement about the pivot screw  $p^2$  and about the pivots  $n'$  connecting the weighted block  $n$  with the supporting arm for the transmitter arm  $g$ . The spring plate  $o$ , as heretofore stated, will permit the free vibration of the arm  $g$  and furthermore will compensate for irregularities in the record by yielding independently of the weighted block  $n$ . The manner of connecting this plate with the arm  $g$  will prevent any rattling in this connection and as heretofore stated, the joint between the block  $n$  and the arms  $m m'$  will prevent rattling at this point. The mass of metal entering into the block  $n$  is such as to prevent or minimize the development of vibrations in this block, thus causing substantially all of the vibrations developed in the arm  $g$  to pass therethrough to the diaphragm  $f$ . The movements of the arm  $g$  and its supporting arm, owing to the irregularities in the record other than the indicated sound waves, will have no tendency to develop vibrations in any part of the apparatus, and any vibrations emanating from the motor cannot be transmitted through the cabinet  $a$  and the arms  $m m'$  to the arm  $g$  with resultant interference.

I have found in actual practice, that a phonograph constructed as herein shown and described, gives a reproduction of great volume and of great purity of tone. No loss of pitch results from a division of the vibrations passing through the arm  $g$  by reason of the connections between this arm and its supporting arm, and no external vibrations enter the arm  $g$  through said supporting arm. The arm  $g$  by this construction is insulated from all parts of the machine excepting the diaphragm.

While in actual practice I have found that the best results are secured by locating the bearings or pivots  $n'$  in the position shown in the drawings, it is not my intention to limit myself to this precise location of said bearings or pivots, this location of said bearings or pivots being merely a matter of degree in the efficiency of the machine.

It is not my intention to limit my invention to the precise details of construction shown in the accompanying drawings, it being apparent that such may be varied

without departing from the spirit and scope of the invention.

Having described my invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal weighted supporting arm, and connections between said supporting arm and said transmitter arm.

2. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, and connections between said supporting arm and said transmitter arm embodying therein a weighted body of a mass sufficient to absorb vibrations, or to be irresponsive to vibrations passing thereto.

3. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal weighted supporting arm, and connections between said supporting arm and said transmitter arm embodying therein a flexible member carried by said supporting arm and connected with said transmitter arm.

4. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, and connections between said supporting arm and said transmitter arm embodying therein a weighted body of a mass sufficient to absorb vibrations, or to be irresponsive to vibrations passing thereto, and a flexible member carried by said weighted body and connected with said transmitter arm.

5. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, and connections between said supporting arm and said transmitter arm embodying therein a weighted body of a mass sufficient to absorb vibrations, or to be irresponsive to vibrations passing thereto, pivotally connected with said supporting arm adjacent the free end thereof, a flexible member carried by said weighted body, and connections between said flexible member and said transmitter arm adjacent the free end thereof.

6. A phonograph embodying therein a stationary diaphragm, a transmitter arm,



means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, a weighted block pivotally mounted thereon, downwardly presented lugs thereon adapted to straddle said transmitter arm, said block being of a mass sufficient to absorb vibrations, or to be irresponsive to vibrations passing thereto, a flexible plate secured to and extending across the space between said lugs, and connections between said plate and said transmitter arm.

7. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, a weighted block pivotally mounted thereon, downwardly presented lugs thereon adapted to straddle said transmitter arm, said block being of a mass sufficient to absorb vibrations, or to be irresponsive to vibrations passing thereto, a flexible plate secured to and extending across the space between said lugs, insulating gaskets between said plate and said lugs, and connections between said plate and said transmitter arm.

8. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, a weighted block pivotally mounted thereon, downwardly presented lugs thereon adapted to straddle said transmitter arm, said block being of a mass sufficient to absorb vibrations, or to be irresponsive to vibrations passing thereto, a flexible plate secured to and extending across the space between said lugs, and connections between said plate and said transmitter arm, comprising a stud embedded in the material of said transmitter arm and firmly attached thereto, a pivot carried by said stud and engaging said plate, and vibration absorbing gaskets between said plate and said stud and said pivot respectively.

9. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, the free end of which has parallel side bars of flexible material, a weighted body, cooperating bearing members carried by said side bars and said body, a flexible member carried by said body, and connections between said flexible member and said transmitter arm.

10. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a

standard axially below said diaphragm, a pivotal block having an axis aligned with the axis of said diaphragm, a supporting arm the opposite ends of which are provided respectively with parallel side bars of flexible material, a weighted body, cooperating bearing members carried by said side bars, and said pivotal block, and said weighted body respectively, a flexible member carried by said body, and connections between said flexible member and said transmitter arm.

11. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a standard axially below said diaphragm, a pivotal block mounted therein, a supporting arm, self-adjusting bearings between said arm and said block, and a universal joint between said supporting arm and said transmitter arm including therein self-adjusting bearings in said supporting arm.

12. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, a weighted block pivotally mounted thereon, downwardly presented lugs thereon adapted to straddle said transmitter arm, said block being of a mass sufficient to absorb vibrations, or to be irresponsive to vibrations passing thereto, a spring plate having its opposite edges secured to said lugs respectively, said plate being reduced intermediate said lugs and having an extended bearing surface in the length of said reduced portion, and a pivot projecting through said bearing surface and engaging said transmitter arm.

13. A phonograph embodying therein a stationary diaphragm, a transmitter arm, a flexible connection between said transmitter arm and said diaphragm, a supporting arm, a universal bearing therefor axially below said diaphragm, a universal bearing connecting the free end of said transmitter arm with the free end of said supporting arm, tensioning means for the diaphragm comprising a weight and a flexible strand connecting said weight with the end of said transmitter arm adjacent said diaphragm, and means permitting variation of the direction of the application of the stress by said weight comprising a loop or hook below and to one side of the axis of said diaphragm, a loop or hook axially below said diaphragm, and means forming a bearing for said strand below said loops or hooks and on a plane intermediate said loops or hooks.

14. A phonograph embodying therein a stationary diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm,



means whereby pressure is exerted upon the free end of said transmitted arm in a direction away from said diaphragm, and tensioning means acting upon said diaphragm  
5 through the means transmitting vibrations from said arm to said diaphragm, comprising a flexible strand, pressure developing means acting constantly upon said strand, and a spring arranged in the length of said  
10 strand whereby retardation or inertia in said pressure developing means will be compensated for.

15 15. A phonograph embodying therein a diaphragm, a transmitter arm, means whereby vibrations passing through said arm are transmitted to said diaphragm, tensioning means for said diaphragm, a pivotal supporting arm, and connections between said

supporting arm and said transmitter arm embodying therein a stud firmly embedded  
20 in said transmitter arm whereby independent vibrations adjacent said stud are prevented, a weighted body, connections between said weighted body and said supporting  
25 arm, and means in conjunction with said stud connecting said transmitter arm with said body.

In witness whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses, this 14th day of  
March, 1913.

CLINTON B. REPP.

Witnesses:

F. T. WENTWORTH,  
EUGENE WENING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

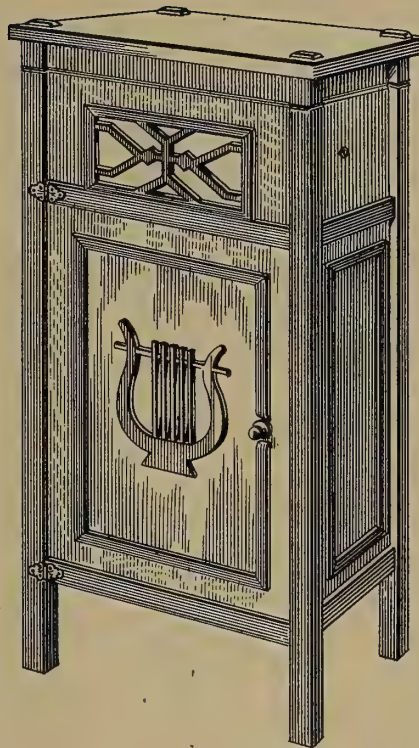
C. E. LIVENGOOD & C. W. BALDWIN.

TALKING MACHINE CABINET.

APPLICATION FILED MAY 28, 1915.

48,003.

Patented Oct. 19, 1915.



Witnesses

*Ed. Schmidt*  
*J. S. Spring King*

Inventors

*C. E. Livengood*  
*C. W. Baldwin*

By

*Victor J. Evans*

Attorney





# UNITED STATES PATENT OFFICE.

CLARENCE E. LIVENGOOD AND CHARLES W. BALDWIN, OF MEYERSDALE,  
PENNSYLVANIA.

DESIGN FOR A TALKING-MACHINE CABINET.

48,003.

Specification for Design.

Patented Oct. 19, 1915.

Application filed May 28, 1915. Serial No. 31,070. Term of patent 7 years.

*To all whom it may concern:*

Be it known that we, CLARENCE E. LIVENGOOD and CHARLES W. BALDWIN, citizens of the United States, residing at Meyersdale, in the county of Somerset and State of Pennsylvania, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The figure is a perspective view of a talking machine cabinet, showing our new design.

We claim:

The ornamental design for a talking machine cabinet, as shown.

CLARENCE E. LIVENGOOD.

CHARLES W. BALDWIN.

Witnesses:

ROBERT COOK,

GRACE E. HOOVER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



DESIGN.

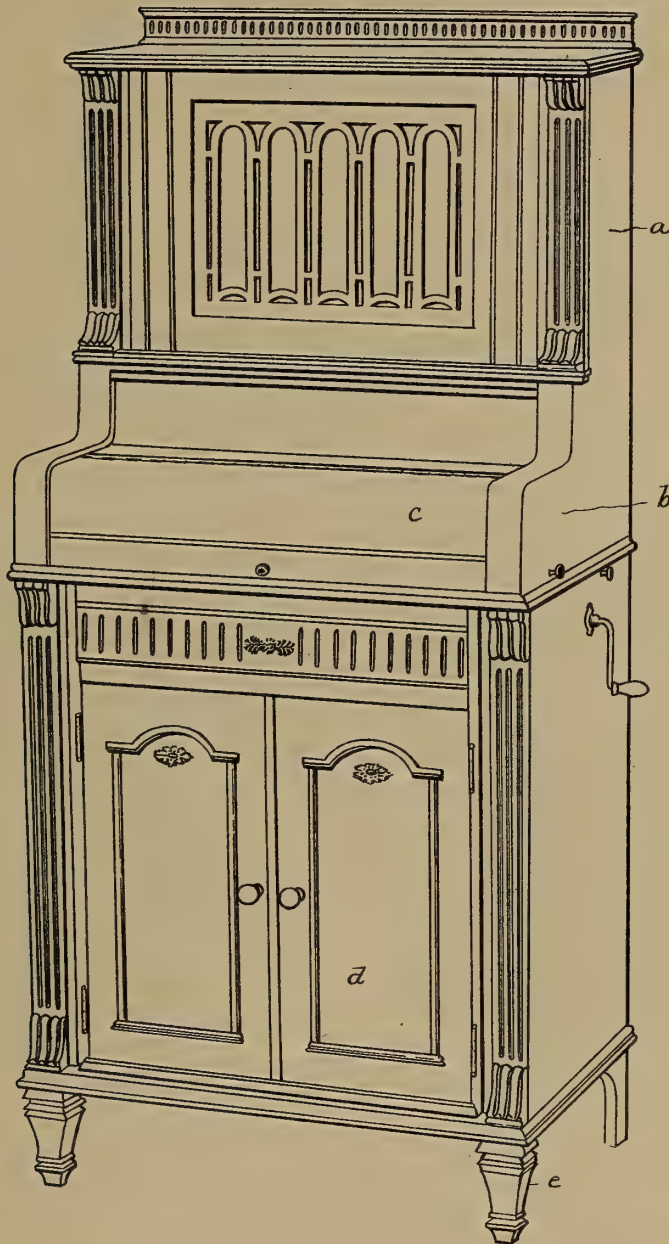
G. M. WILLSON.

TALKING MACHINE CABINET.

APPLICATION FILED APR. 22, 1915.

48,019.

Patented Oct. 19, 1915.



*G. M. Willson* Inventor

By his Attorney  
*Louis M. Sanders*





# UNITED STATES PATENT OFFICE.

GEORGE M. WILLSON, OF MONTOURSVILLE, PENNSYLVANIA.

DESIGN FOR A TALKING-MACHINE CABINET.

48,019.

Specification for Design.

Patented Oct. 19, 1915.

Application filed April 22, 1915. Serial No. 23,258. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, GEORGE M. WILLSON, a citizen of the United States, residing in Montoursville, county of Lycoming, and State of Pennsylvania, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

The figure is a perspective view of a cabinet showing the general contour lines and ornamentation of my improved design; the upper portion *a* is designed to contain the horn or sound amplifier. Below this is a forward inclosed projection *b* provided with a fall-board *c*, which incloses the motor and turn-table of a talking machine. Beneath this is a compartment inclosed by the doors

*d* for containing the record tablets. The entire cabinet is supported by the ornamental legs *e*. The upper portion *a* is ornamented by a panel grille and voluted corner posts. The doors *d* are flanked on either side at the corner of the cabinet by voluted ornamental posts.

I claim—

The ornamental design for a talking machine cabinet substantially as shown and described.

In testimony whereof, I have hereunto set my hand and affixed my seal this 19th day of April, 1915.

GEO. M. WILLSON.

In presence of—

MARTHA LAEDLEIN,

THOS. H. HAMMOND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES PATENT OFFICE

OFFICE OF THE COMMISSIONER OF PATENTS, WASHINGTON, D. C.

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DESIGN.

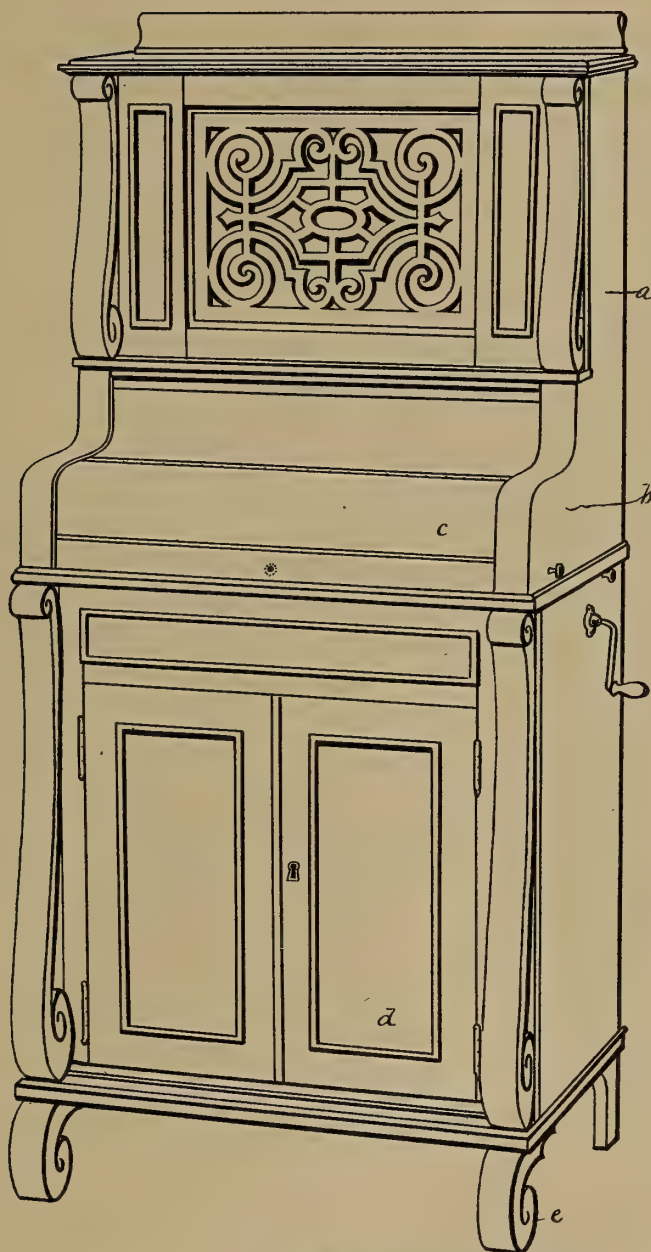
G. M. WILLSON.

TALKING MACHINE CABINET.

APPLICATION FILED APR. 22, 1915.

48,020.

Patented Oct. 19, 1915.



*G. M. Willson* Inventor  
By *His Attorney*  
*Louis M. Sanders*



# UNITED STATES PATENT OFFICE.

GEORGE M. WILLSON, OF MONTOURSVILLE, PENNSYLVANIA.

DESIGN FOR A TALKING-MACHINE CABINET.

Specification for Design.

48,020.

Application filed April 22, 1915. Serial No. 23,259. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, GEORGE M. WILLSON, a citizen of the United States, residing in Montoursville, county of Lycoming, and State of Pennsylvania, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

The figure is a perspective view of a cabinet showing the general contour lines and ornamentation of my improved design; the upper portion *a* is designed to contain the horn or sound amplifier. Below this is a forward inclosed projection *b* provided with a fall-board *c*, which incloses the motor and turn-table of a talking machine. Beneath

this is a compartment inclosed by the doors *d* for containing the record tablets. The entire cabinet is supported by the ornamental legs *e*. The upper portion *a* is ornamented by a panel scroll and scroll corner posts. The doors *d* are flanked on either side at the corner of the cabinet with scroll corner posts.

I claim—

The ornamental design for a talking machine cabinet substantially as shown and described.

In testimony whereof, I have hereunto set my hand this 19th day of April, 1915.

GEORGE M. WILLSON.

In presence of—

MARTHA LAEDLEIN,

THOS. H. HAMMOND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





DESIGN.

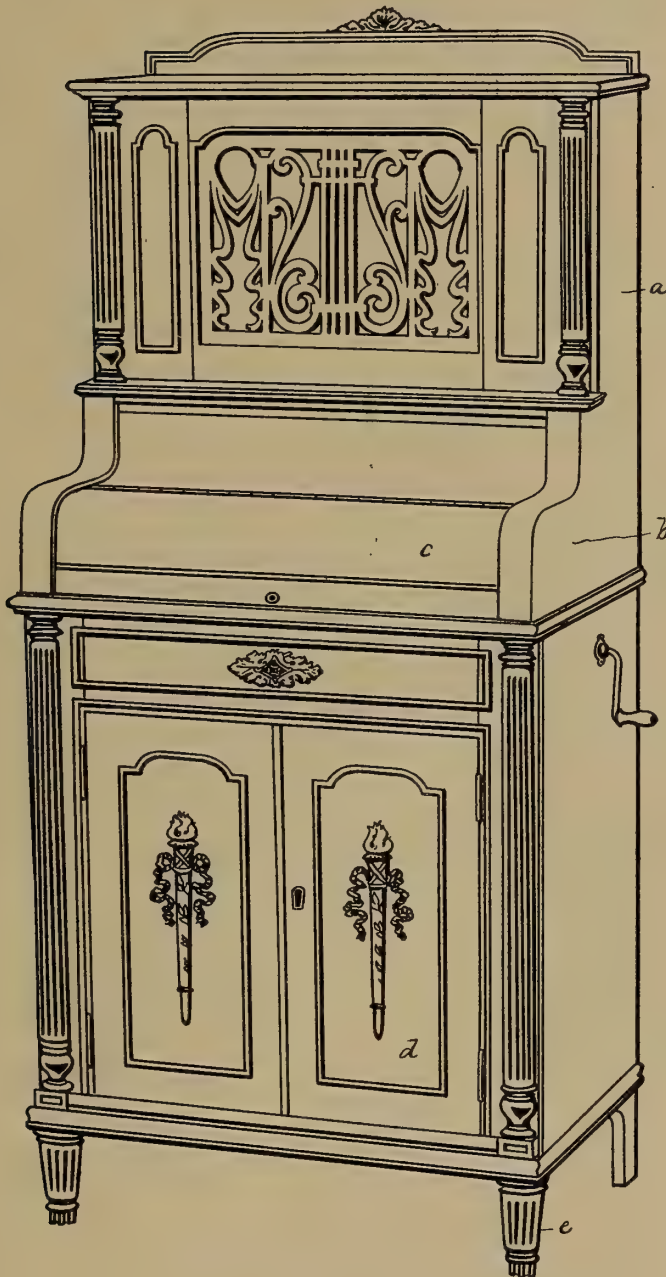
G. M. WILLSON.

TALKING MACHINE CABINET.

APPLICATION FILED APR. 22, 1915.

48,021.

Patented Oct. 19, 1915.



G. M. Willson Inventor  
By his Attorney  
Louis M. Sanders





# UNITED STATES PATENT OFFICE.

GEORGE M. WILLSON, OF MONTOURSVILLE, PENNSYLVANIA.

DESIGN FOR A TALKING-MACHINE CABINET.

48,021.

Specification for Design.

Patented Oct. 19, 1915.

Application filed April 22, 1915. Serial No. 23,260. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, GEORGE M. WILLSON, a citizen of the United States, residing in Montoursville, county of Lycoming, and State of Pennsylvania, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

The figure is a perspective view of a cabinet showing the general contour lines and ornamentation of my improved design; the upper portion *a* is designed to contain the horn or sound amplifier. Below this is a forward inclosed projection *b* provided with a fall-board *c*, which incloses the motor and turn-table of a talking machine. Beneath this is a compartment inclosed by the doors

*d* for containing the record tablets. The entire cabinet is supported by the ornamental legs *e*. The upper portion is ornamented by a panel grill and semi-cylindrical voluted corner posts with top and bottom ornamentation. The doors *d* are flanked at either side at the corner of the cabinet by semi-cylindrical voluted ornamental posts with top and bottom finials and bases.

I claim—

The ornamental design for a talking machine cabinet substantially as shown and described.

In testimony whereof, I have hereunto set my hand this 19th day of April, 1915.

GEORGE M. WILLSON.

In presence of—

MARTHA LAEDLEIN,

THOS. H. HAMMOND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



RECORD CLEANING ATTACHMENT FOR TALKING  
MACHINES,

# 1,157,958-----J. W. Pitcher,  
Patented-October 26th, 1915.  
Filed-February 12, 1915.

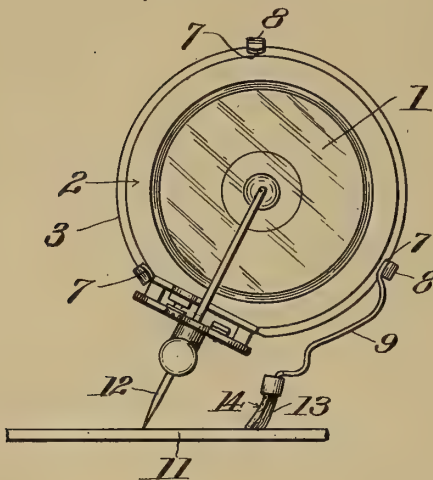


J. W. PITCHER.  
 RECORD CLEANING ATTACHMENT FOR TALKING MACHINES.  
 APPLICATION FILED FEB. 12, 1915.

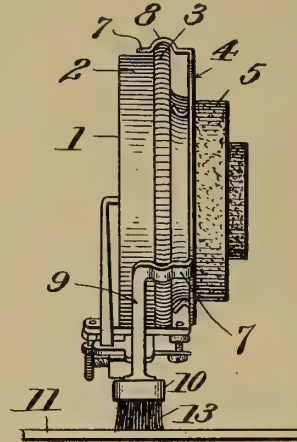
1,157,958

Patented Oct. 26, 1915.

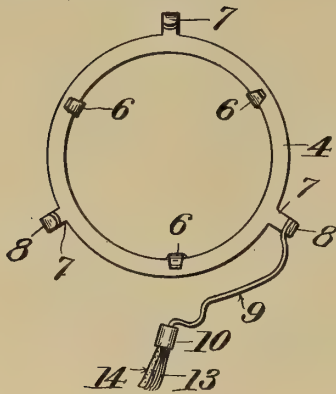
*Fig. 1.*



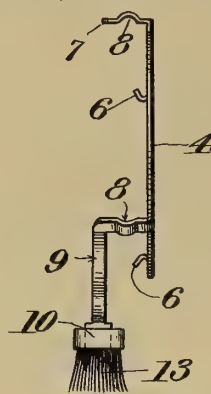
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



Witnesses  
*C. M. Walker.*  
*Benz Blumstein*

Inventor  
*Joseph W. Pitcher*  
 By *Chas. E. Rindley*  
 Attorney

# UNITED STATES PATENT OFFICE.

JOSEPH W. PITCHER, OF WASHINGTON, DISTRICT OF COLUMBIA.

RECORD-CLEANING ATTACHMENT FOR TALKING-MACHINES.

1,157,958.

Specification of Letters Patent.

Patented Oct. 26, 1915.

Application filed February 12, 1915. Serial No. 7,844.

*To all whom it may concern:*

Be it known that I, JOSEPH W. PITCHER, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Record-Cleaning Attachments for Talking-Machines, of which the following is a full, clear, and exact specification.

This invention relates to sound reproducing instruments and has for its object to provide improved means for cleaning the grooves in a record in advance of the needle, said cleaning device being detachably mounted on the sound box.

The chief aim of this invention is to provide a cleaning attachment of the kind described which may be adjusted to correspond with needles of different lengths, it being well understood that needles of different lengths are used to secure different tone effects. Obviously, a cleaning device which is not adjustable on the sound box may be effective when one length of needle is used and have little or no effect when a longer needle is substituted, hence the desirability of providing an adjustable cleaning device which will be equally effective with different lengths of needles.

A further object of the invention is to increase the effectiveness of the cleaning device by having it act against the record under spring pressure in an improved manner to be presently described.

Other objects are to eliminate the unpleasant sounds caused by the contact of the needle with the surface of the record in use, and to bring the cleaning device in close proximity to the needle, whereby any disagreeable screechy or other noises are appreciably muffled or deadened.

Other objects will appear as the description proceeds.

The invention will be first hereinafter described in connection with the accompanying drawings, which constitute a part of this specification, and then more specifically defined in the claims at the end of the description.

In the accompanying drawings, wherein similar reference characters are used to designate corresponding parts throughout the several views:—

Figure 1 is a side elevation of a sound box equipped with my improved cleaning attachment, a portion of the record also being

shown in edge view; Fig. 2 is a rear edge view of the sound box, showing more clearly how the attachment is detachably mounted thereon; Fig. 3 is a detailed rear view of the attachment, and Fig. 4 is an edge view of the same.

The sound box 1, which is of a well known type, has a peripheral flange 2, at the inner edge of which there is a projecting roughened bead 3. My attachment is preferably made in the form of a ring 4, as best illustrated in Fig. 3, and is of a size about equal to the flange 2 of the sound box and adapted to be slipped over the reduced rear portion of the sound box before the latter is attached to the tubular arm (not shown) leading to the amplifying chamber of a phonograph.

The ring 4 is provided with short lugs 6 bent so as to engage the rear face of the flange 2 of the sound box, and with longer lugs or arms 7 which extend over the roughened bead 3 and are preferably curved for a portion of their length, as at 8, to correspond to the shape of said bead. Said curved portions 8 embrace the bead 3 and the resiliency of said arms 7 cause them to grip said bead with sufficient force to retain the attachment in the desired adjustment on the sound box, the lugs 6 serving to space the ring 4 a suitable distance away from the flange 2. The ring 4 is further provided with a long arm 9 extending from the end of one of the arms 7 in substantially tangential relation to the ring and flange of the sound box. This arm 9 is preferably at least as long as the radius of the sound box and is of sufficient resiliency to exert proper force upon the cleaning member 10 which is detachably carried by its lower end for pressing said cleaning member against the record 11. The cleaning member 10 being readily detachable, the same may be renewed when worn or different characters of cleaning members substituted one for the other.

The proper adjustment of the cleaning attachment with respect to the needle 12, mounted on the sound box, is illustrated in Fig. 1. When a longer or shorter needle is substituted, the ring 4 is turned slightly on the sound box in the proper direction so as to adjust the cleaning member 10 to the proper level as regards the point of the new needle. The resilient engagement of the



curved portions 8 of the arms 7 with the roughened surface of the bead 3 helps to retain the ring in the desired adjustment.

In order to eliminate the disagreeable sound or "screeching" which is usually caused by the contact of the needle with the surface of a record, I have provided a novel cleaning member consisting of layers of bristles 13 and felt 14, as clearly illustrated in Figs. 1 and 3. These layers are arranged so that the bristles come in contact with the surface of the record in advance of the felt, the latter serving as a cushion against which the bristles act and also engaging the surface of the record so as to appreciably muffle the screeching sound caused by the needle scraping over the record. By the use of the felt, as 14, small particles which might otherwise pass through the bristles 13, if the felt were absent, are also caught by the felt and swept out of the path of movement of the needle.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. An attachment of the character described comprising a ring, resilient clamping arms projecting from said ring to engage the periphery of the sound box for retaining the attachment thereon, lugs projecting from the ring to space the same away from the sound box, and a cleaning member attached to one of said arms and adapted to contact with the surface of a record.

2. An attachment of the character described comprising a rigid part adjustably mounted on a sound box, a resilient clamping arm engaging a portion of the sound box for retaining the attachment in a desired position thereon, a resilient extension on the outer end of said arm, and a cleaning member on the end of said extension.

3. An attachment of the character described comprising a rigid part adjustably mounted on a sound box, a resilient clamping arm engaging a portion of the sound box for retaining the attachment in a desired position thereon, a resilient extension on the outer end of said arm arranged substantially in tangential relation to the sound box, and a cleaning member on the end of said extension.

4. An attachment of the character described comprising a part attached to a sound box, a cleaning member attached to said part, said cleaning member composed of layers of bristles and felt, the layer of bristles being arranged to engage the surface of a record in advance of the layer of felt, the latter serving to sweep out of the path of the needle small particles that might pass through said bristles.

5. An attachment of the character described comprising a ring, resilient clamping arms projecting from said ring to engage the periphery of the sound box for retaining the attachment thereon, lugs projecting from the ring to space the same away from the sound box and a cleaning member attached to the ring and adapted to contact with the surface of a record and composed of layers of bristles and felt, the layer of bristles being arranged to engage the surface of a record in advance of the layer of the felt, the latter serving to sweep out of the path of the needle small particles that might pass through said bristles.

In testimony whereof I have signed my name to this specification in the presence of two attesting witnesses.

JOSEPH W. PITCHER.

Witnesses:

CHAS. E. RIORDON,

E. L. STEIRZER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



SOUND BOX FOR TALKING MACHINES,  
# 1,158,316-----H. Sheble,  
Patented-October 26, 1915.  
Filed-March 5th, 1915.

H. SHEBLE.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED MAR. 5, 1915.

1,158,316.

Patented Oct. 26, 1915.

FIG. 1.

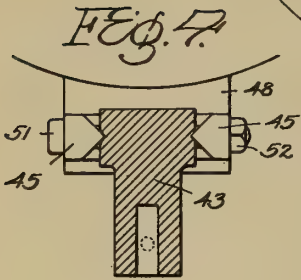
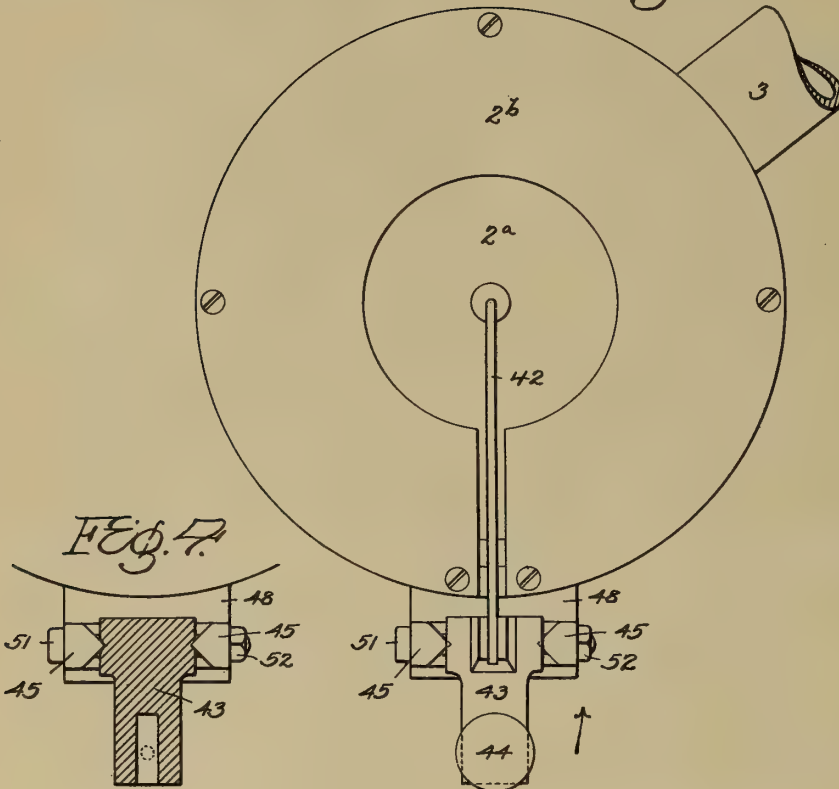


FIG. 2.

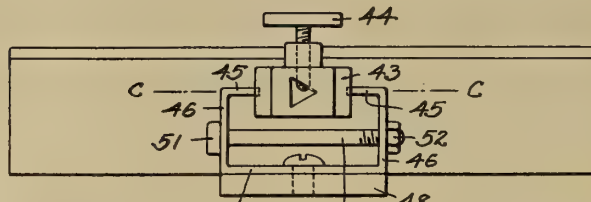
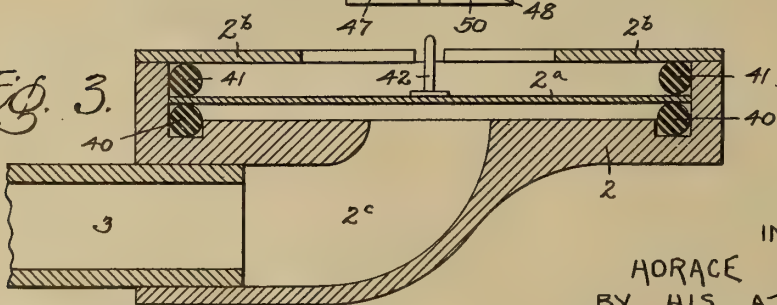


FIG. 3.



WITNESSES *Samuel D. Turner*  
*Elsie Fullerton*

INVENTOR  
HORACE SHEBLE  
BY HIS ATTORNEY  
*Harry Smith*

# UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA.

## SOUND-BOX FOR TALKING-MACHINES.

1,158,316.

Specification of Letters Patent.

Patented Oct. 26, 1915.

Application filed March 5, 1915. Serial No. 12,245.

*To all whom it may concern:*

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to so construct a talking machine sound box as to tend to maintain in one position the lever which carries the stylus or needle and to return said lever to such position when it has been deflected therefrom. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which—

Figure 1 is a face view, on enlarged scale, of a sound box constructed in accordance with my invention; Fig. 2 is an edge view of the same, looking in the direction of the arrow Fig. 1; Fig. 3 is a transverse section of the sound box and part of the tone arm connected thereto, and Fig. 4 is a sectional view on the line *c—c*, Fig. 2.

The construction of the sound box is shown in Fig. 3, on reference to which it will be observed that the hollow body of the box contains the usual diaphragm 2<sup>a</sup> the peripheral portion of which is confined between rings 40 and 41 of rubber or other elastic material, the supporting ring 40 which contacts with the inner face of the diaphragm being contained in a groove in the base of the sound box and the confining ring 41 which bears upon the outer face of the diaphragm being held in contact therewith by the annular cap or cover plate 2<sup>b</sup>. The base of the sound box has a curved passage 2<sup>c</sup> which communicates with the tone arm 3 and the bearing head at the inner end of the needle carrying lever 42 rests upon or is secured to the center of the diaphragm above the entrance to said passage 2<sup>c</sup>, as shown in Figs. 1 and 3.

The needle carrying lever 42 has an enlarged head 43 in which is formed the socket for the reception of the needle, the latter being secured in place by means of a confining screw 44, and the needle carrying lever is retained in its normal position by reason of its engagement with the elastic fulcrum members, the opposite sides of the head 43 of the needle carrying lever having formed therein V-shaped recesses for the reception of the V-shaped ends of the inturned upper portions 45 of the side members 46 of an

elastic yoke whose base member 47 is secured to an arm 48 projecting from the sound box 2, this method of mounting the needle carrying lever being best shown in Figs. 1, 2 and 4 of the drawing.

Connecting the opposite arms 46 of the elastic yoke is a bolt 50 having at one end a head 51 and at the other end a nut 52, the latter being adapted to the threaded end of the bolt so that by adjustment of the nut the pressure of the V-shaped ends of the members 45 of the yoke can be varied, the elasticity of those portions of the yoke intervening between its bearing points and the bolt 50, however, constituting a factor in the vibratory movements of the needle lever.

That portion of the needle lever 42 intervening between the fulcrum of the lever and its point of contact with the sound box diaphragm 2<sup>a</sup> is so much greater than the distance between the fulcrum of the lever and the point of the needle carried thereby as to properly amplify the vibrations imparted to the needle.

The V-shaped ends of the spring contact fulcrum of the needle carrying lever bite into the latter and cause its vibrations to be imparted to the spring, whose torsional resistance thus tends to constantly maintain the lever in one position and to return it to such position when it has been deflected therefrom, the result being a prompt response of the needle to the conformation of the record groove and a correspondingly perfect reproduction of the sounds from which the record was produced.

I claim:

1. A talking machine sound box having a needle carrying lever with a frictional spring contact fulcrum which exercises torsional control of the lever.

2. A talking machine sound box having a needle carrying lever, with a frictional spring contact fulcrum comprising elastic fulcrum members having pointed ends which are caused to engage the sides of the needle carrying lever.

3. A talking machine sound box having a needle carrying lever with a pointed frictional spring contact fulcrum which exercises torsional control of the lever.

4. A talking machine sound box having a needle carrying lever, with a spring contact fulcrum comprising elastic fulcrum members having pointed ends which are caused to engage the sides of the needle car-



rying lever, and means for varying the pressure of said pointed ends against the lever.

5 5. A talking machine sound box having a needle carrying lever, and an elastic yoke having inturned arms which engage said lever and serve as a fulcrum therefor which exercises torsional control of the lever.

10 6. A talking machine sound box having a casing, a diaphragm, means for retaining said diaphragm at its peripheral portion, a needle carrying lever, and a frictional spring contact fulcrum for the latter which exercises torsional control of the lever.

15 7. A talking machine sound box having a needle carrying lever, and an elastic fulcrum for the latter comprising opposite elastic members having pointed ends which are caused to engage the sides of the needle carrying lever and serve to transmit the

vibratory movements of the latter to said fulcrum. 20

8. A talking machine sound box having a needle carrying lever, and an elastic fulcrum mounting for the latter comprising elastic fulcrum members having pointed 25 ends which are caused to engage the sides of the needle carrying lever and tend to maintain said lever in one position, and also to return it to such position when deflected therefrom. 30

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

HORACE SHEBLE.

Witnesses:

KATE A. BEADLE,  
HAMILTON D. TURNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

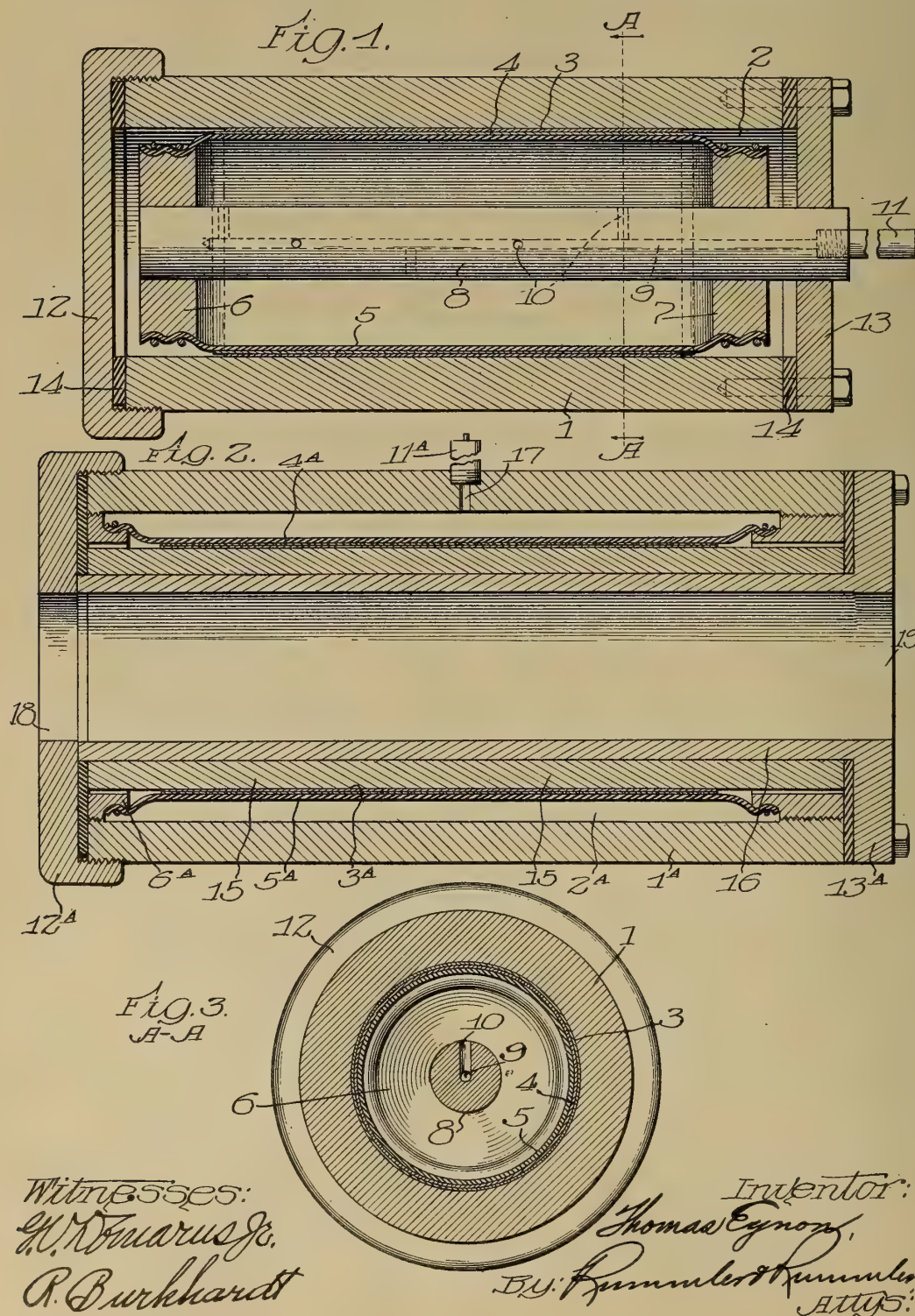
PHONOGRAPHIC RECORD,  
# 1,158,377-----T. Eynon,  
Patented-October 26, 1915.  
Filed-November 11, 1911.

T. EYNON.  
 PHONOGRAPHIC RECORD.  
 APPLICATION FILED NOV. 11, 1911.

1,158,377.

Patented Oct. 26, 1915.

2 SHEETS—SHEET 1.





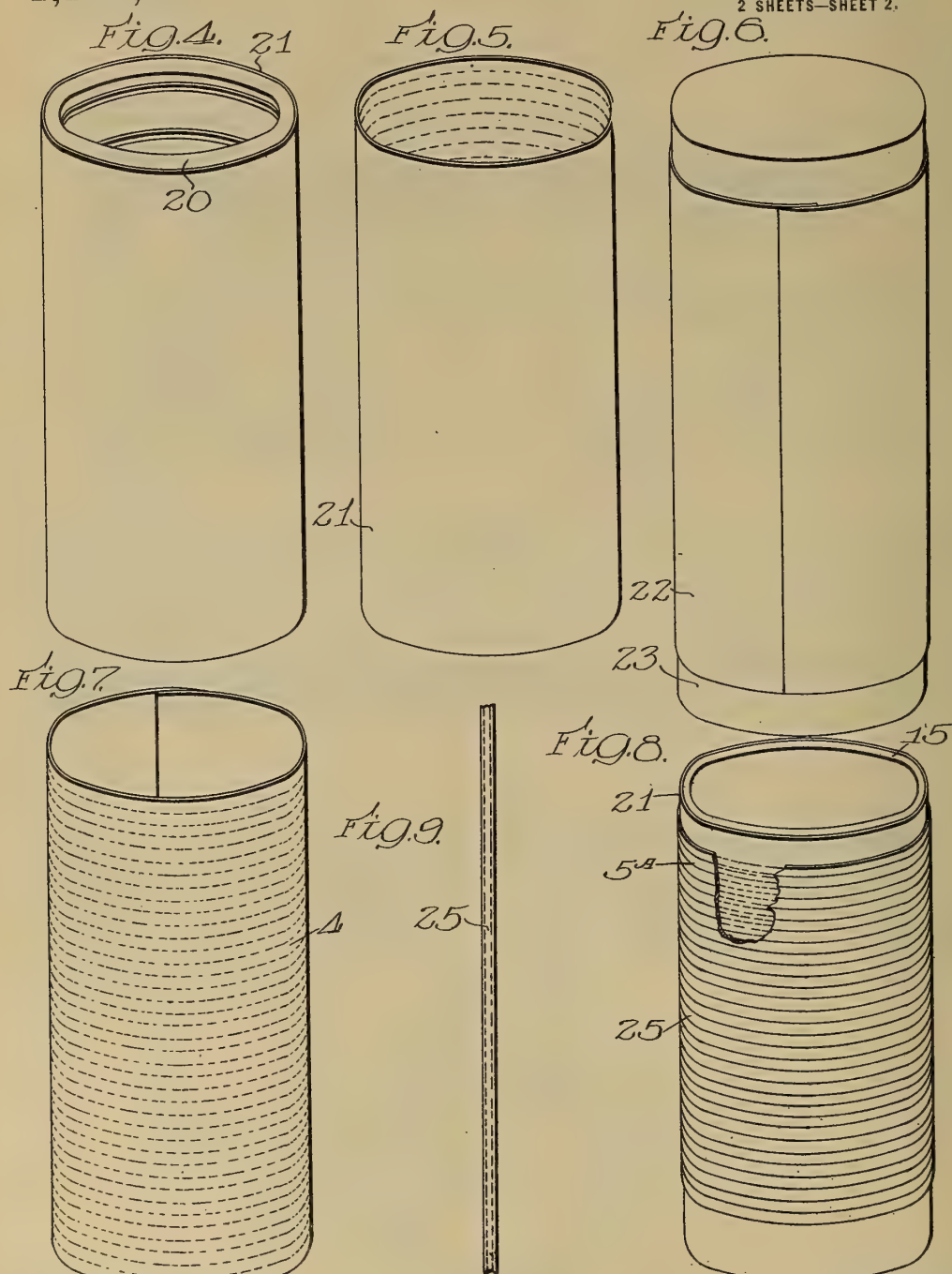


T. EYNON.  
 PHONOGRAPHIC RECORD.  
 APPLICATION FILED NOV. 11, 1911.

1,158,377.

Patented Oct. 26, 1915.

2 SHEETS—SHEET 2.



Witnesses:  
 G. W. Kuvarus Jr.  
 R. Burkhardt.

Inventor:  
 Thomas Eynon.  
 BY: Hummer & Hummer  
 Attys:

# UNITED STATES PATENT OFFICE.

THOMAS EYNON, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO RIBBON RECORD COMPANY, A CORPORATION OF ILLINOIS.

## PHONOGRAPHIC RECORD.

1,158,377.

Specification of Letters Patent.

Patented Oct. 26, 1915.

Application filed November 11, 1911. Serial No. 659,745.

*To all whom it may concern:*

Be it known that I, THOMAS EYNON, a citizen of the United States of America, and a resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Phonographic Records, of which the following is a specification.

The main objects of this invention are to provide an improved method of making flexible phonographic records; to provide an improved method of reproducing flexible records from an initial plastic record; to provide an improved method of obtaining a record blank; to provide an improved method of securing the matrix and record blank in position for reproducing the phonographic impression; to provide an improved method of reproducing the phonographic impression of the matrix upon the record blank; to provide improved apparatus for making flexible records either in cylindrical or strip forms; to provide an improved form of record blank which is inexpensive, flexible, and adapted to be packed in compact form for shipment and storage; to provide an improved record having multiple impressions formed thereon in substantially parallel relation, each impression being the reproduction of individual vocal or instrumental parts adapted to be rendered in concert; and to provide an improved method of obtaining the simultaneous and harmonious reproduction of the several impressions.

The accompanying drawings illustrate diagrammatically the various steps of the process, also suitable mechanism for carrying out this invention and the resulting product.

Figure 1 is a sectional elevation of an apparatus for transferring the impression to the outer surface of a record blank. Fig. 2 illustrates an apparatus for transferring the impression to the interior surface of a record blank. Fig. 3 is a transverse sectional view taken on the line A—A of Fig. 1. Fig. 4 is a perspective view of an electro-plated plastic record. Fig. 5 is a perspective view of the electro-plate removed from the plastic record. Fig. 6 is a perspective view of a mandrel upon which the paper record blank is formed, a blank being shown in position thereon. Fig. 7 is a

perspective view of the paper record. Fig. 8 is a perspective view of a matrix record showing a record blank in position thereon, as made up from a strip of paper. Fig. 9 is a fragmentary face view of the strip removed from the matrix after the impression has been taken.

In the apparatus shown in Fig. 1 of the drawings, as designed to carry out this invention, a member 1, preferably in the form of a cylinder, has a cylindrical bore 2, which is adapted to receive the matrix record 3, the exterior diameter of the matrix being substantially equal to the diameter of the bore 2, so as to snugly fit therein and prevent the matrix from becoming distorted when pressure is exerted against it. The pneumatic means whereby pressure is obtained for reproducing the impression of the matrix record upon the record blank 4 comprises a flexible diaphragm in the form of a rubber cylinder 5, firmly secured at its ends to disks 6 and 7, carried on the rod 8. The rod 8 has a longitudinal bore 9 extending inward from one end and communicating with the interior of the rubber cylinder 5 by means of a plurality of transverse apertures 10. The outer end of the rod 8 is provided with a pneumatic valve 11 of the usual construction, which permits the injection of air into the rubber casing 5, but prevents its escape unless manually operated. The cylinder 1 is provided with a cap 12 screwed on to one end, and a cap 13 bolted to the opposite end. Gaskets 14, preferably of rubber, are interposed between the caps 12 and 13 and the ends of the cylinder 1.

The apparatus shown in Fig. 2 is adapted for use when the matrix record 3 has an impression formed on the exterior surface, whereupon the impression is reproduced upon the interior surface of the record blank 4<sup>A</sup>. In this apparatus, the matrix record 3<sup>A</sup> is secured upon a cylinder 15, which is inserted into the casing 1<sup>A</sup> and is supported upon a mandrel member 16, rigidly carried by the cap 13<sup>A</sup>. The pneumatic means comprises a flexible diaphragm in the form of a rubber casing or cylinder 5<sup>A</sup> secured upon rings 6<sup>A</sup>, which may be suitably secured to the casing 1<sup>A</sup> within the bore 2<sup>A</sup>, as by means of a threaded connection. The annular space between the rubber casing 5<sup>A</sup>



and the cylinder 1<sup>A</sup> then becomes the pneumatic chamber, and communication thereto is had by means of the aperture 17 controlled by the pneumatic valve 11<sup>A</sup>. In this construction, the caps 12<sup>A</sup> and 13<sup>A</sup> are provided with apertures 18 and 19, the purpose of which will be hereinafter explained.

My improved process primarily consists in forming a matrix record from the initial impression upon a plastic record, making a record blank, and reproducing the impression on the matrix record upon the record blank by means of the apparatus just described. In describing the various steps of my process, I will first describe such steps as they are to be performed when the records are to be made with the apparatus as shown in Fig. 1, and then describe the steps that are taken when the records are to be reproduced with the apparatus shown in Fig. 2. In either instance, the initial phonographic impression is made upon the usual plastic cylinder 20. If the record is to have several separate and individual impressions formed thereon to be simultaneously reproduced in concert, to constitute a harmonious whole, each instrumental or vocal part is separately and successively recorded upon the record in successive convolutions simultaneously during the rendition of all the parts in concert. For instance, in a vocal solo with piano accompaniment, the solo is recorded independently of the accompaniment while the piano is accompanying the singing as under the usual conditions, and then the solo and accompaniment are repeated while the piano accompaniment is reproduced upon the record blank independently of the solo, the impressions on the record being engraved adjacent and in parallel relation to the impression engraved for the solo. The record is then electro-plated with a metal deposit 21, preferably of copper.

If the electro-plate 21, which constitutes the matrix record 3, is to be used for reproducing records with the apparatus shown in Fig. 1, the exterior surface is milled or filed so that its diameter is exactly equal to the diameter of the bore 2, after which the electro-plate 21 and cylinder 20 are separated. After the electro-plate 21 and the cylinder 20 have been separated, the electro-plate or matrix record 3 is placed in the casing 1 in preparation for reproducing the phonographic impression thereon upon a record blank.

If a cylindrical record is to be made, the record blank comprises a piece of flexible material 22, such as a sheet of paper, which is formed into a cylinder. This is most easily done by wrapping the sheet of paper 22 about a mandrel or form 23, so that the exterior diameter of the paper cylinder will be substantially equal to the interior diameter of the matrix record 3. The

ends of the paper are slightly tapered so as to make as neat and substantially imperceptible a joint as possible where the two ends of the paper overlap. The outer surface of the paper cylinder is then coated with a plastic substance or composition, such as shellac, and allowed to dry. After the shellac has dried, the paper cylinder, which then constitutes the record blank 4, is placed within the matrix record 3 and a reproduction of the impression on the matrix is made upon the record blank. If one coating of shellac is found to be insufficient, a second or third coat may be applied after each coat has become dried.

If the electro-plate 21 is to be used for reproducing records with the apparatus shown in Fig. 2, after milling or filing to render it true, the electro-plate is removed from the plastic cylinder 20, which may be readily done by slitting the electro-plate longitudinally. The electro-plate is then reversed and placed upon a cylinder 15 with the surface having the phonographic impression facing outwardly. The electro-plate is suitably secured to the cylinder 15, as by means of glue, and the convolutions of the impression accurately matched at the juncture of the slit. The cylinder 15, together with the electro-plate 21, then constitutes the matrix record 4<sup>A</sup>. A record blank, comprising a cylinder of flexible material, such as paper, having its interior surface coated with shellac and having its interior diameter substantially equal to the exterior diameter of the matrix 4<sup>A</sup> may be used for having the phonographic impression reproduced thereon.

If a record is to be made in the form of a strip, a strip of paper, substantially equal in width to the distance between the convolutions of the phonographic impressions on the matrix record 4 or 4<sup>A</sup> is coated with a plastic substance, such as shellac, and allowed to dry. The strip is then placed upon the embossed face of the matrix record 4<sup>A</sup> by securing one end thereto, and spirally winding the strip upon the matrix record so that the middle of each convolution of the strip is directly over the respective phonographic impression, and then securing the other end of the strip. The matrix record and its record blank are then placed in one or the other of the apparatuses shown for making the impression on the matrix upon the strip. After the impression has been taken, the strip is unfastened from the matrix and the record will then be in the form of a long strip. It is also possible to have the paper record 4 made into a strip by placing the record upon a mandrel and putting the mandrel in a lathe. The lathe may then be adjusted to give the proper movement to a cutting tool, so as to travel along and cut the record between the convolutions

or sets of convolutions of the phonographic impression, whereupon the record becomes a strip similar to that shown in Fig. 9.

After the apparatus, as shown in either of the Figs. 1 and 2, is assembled with the matrix record, record blank and pneumatic means all in position, air is forced into the pneumatic chamber through the controlling valve, thereby causing the rubber diaphragm 5 or 5<sup>A</sup> to expand and bear against the record blank, so as to create a uniform pressure over the entire surface of the record blank and cause the shellacked surface to have reproduced thereon the phonographic impression on the matrix record. In order to slightly soften the shellacked surface of the record blank, it is desirable to apply heat thereto, which may be conveniently done by placing the apparatus in a heated oven or by immersing the apparatus shown in Fig. 1 in hot water or by running the hot water through the cylinder 24, in the apparatus shown in Fig. 2, for which purpose the apertures 18 and 19 are provided in the ends 12<sup>A</sup> and 13<sup>A</sup>. The apparatus is then allowed to cool so that the shellacked surface again becomes hardened, whereupon the apparatus may be dismantled and the reproduced record removed.

The product is a simple and inexpensive record, not readily destroyed accidentally, and one which may be packed in compact form either for shipment or storage. When one of these records is to be played, it is placed upon a suitable holder or reel capable of being connected with the phonograph, and the reproducing stylus is set to engage and trace the impression thereon. If the record bears multiple impressions, as hereinbefore explained, a plurality of reproducing styluses are properly set to respectively engage and trace the separate impressions so that all the impressions are simultaneously and harmoniously reproduced.

No attempt has been made to show all

possible modifications of this invention, and it will be understood that numerous details may be altered or omitted without departing from the spirit of this invention, as defined by the following claims.

I claim:—

1. The process of reproducing flexible phonographic records which consists in forming a matrix record from an initial plastic record having a phonographic impression made thereon, separating said matrix and plastic record, placing a record blank upon said matrix record in the form of a spirally wound strip disposed substantially symmetrically over the phonographic impression along its length, the width of said strip being substantially equal to the distance between the convolutions of the phonographic impression, and applying fluid pressure to said record blank.

2. The process of producing a flexible phonographic record having multiple impressions thereon, which consists in separately recording in a group of parallel spirals upon the same cylindrical record blank, a plurality of individual vocal or instrumental parts rendered in concert, making a matrix of said record, separating said matrix and record, placing a thin flexible record strip of long narrow shape against said matrix in symmetrical alignment over said group of parallel spirals, applying pressure to cause the multiple spiral impressions on said matrix to be embossed symmetrically upon said record strip, and then separating said record strip and said matrix, thus providing a continuous integral strip having all of said individual records embossed thereon in parallel lines extending lengthwise of said strip.

Signed at Chicago this 7th day of November 1911.

THOMAS EYNON.

Witnesses:

MARY H. BIXEL,  
EDWIN PHELPS.



The history of the world is a vast and complex subject, encompassing the lives and actions of countless individuals and the events that have shaped the human experience. From the earliest civilizations to the modern era, the story of humanity is one of constant change and evolution. The study of history allows us to understand the patterns of human behavior, the causes of conflict, and the progress of society. It is a discipline that seeks to uncover the truth about the past, providing us with a deeper understanding of the world we live in today. The history of the world is a tapestry of diverse cultures, languages, and traditions, each contributing to the rich and varied fabric of human civilization. Through the study of history, we can learn from the mistakes of the past and strive for a better future.



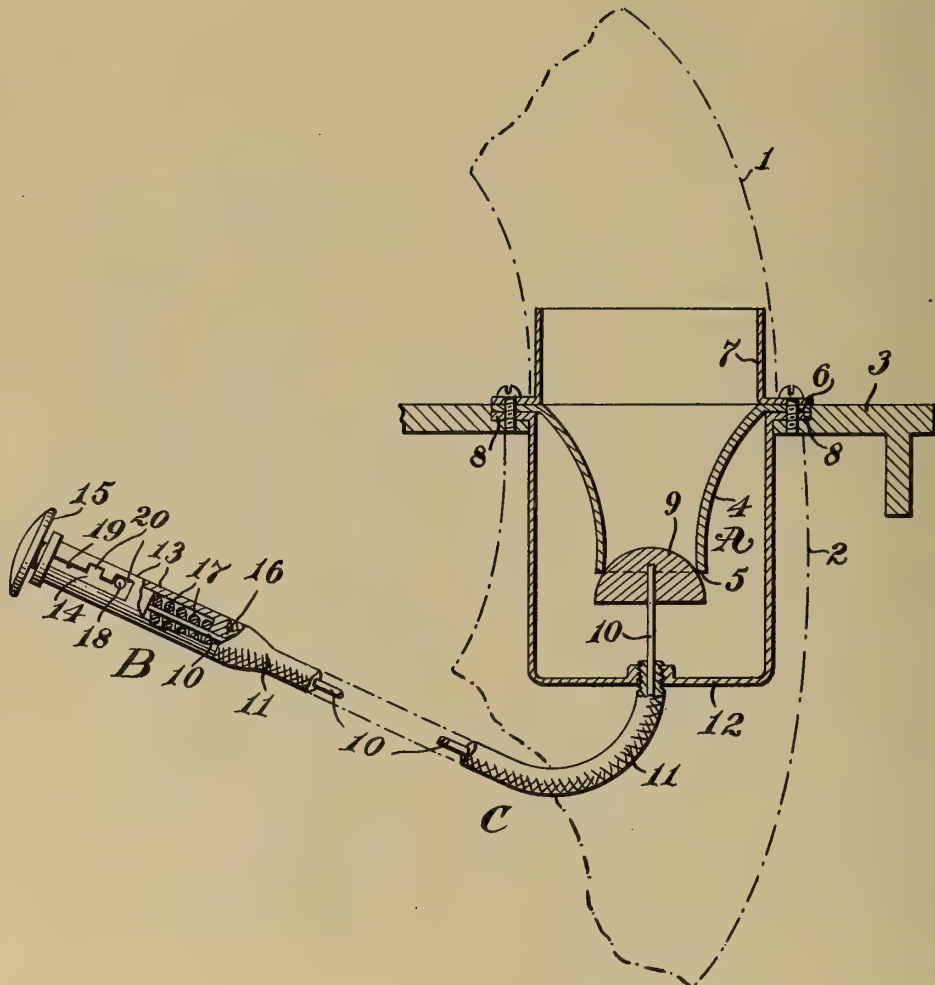
PHONOGRAPH PATENT.

TALKING MACHINE,  
# 1,158,401-----F. J. Empson,  
Patented-October 26, 1915.  
Filed-October 31, 1914.

F. J. EMPSON.  
TALKING MACHINE.  
APPLICATION FILED OCT. 31, 1914.

1,158,401.

Patented Oct. 26, 1915.



Attest:  
*Geo. D. Beatty*  
*Joseph F. Meany*

Inventor:  
*Frederick James Empson*  
by *E. W. Scher* Atty

# UNITED STATES PATENT OFFICE.

FREDERICK JAMES EMPSON, OF SYDNEY, NEW SOUTH WALES, AUSTRALIA, ASSIGNOR  
TO THE AEOLIAN COMPANY.

## TALKING-MACHINE.

1,158,401.

Specification of Letters Patent. Patented Oct. 26, 1915.

Original application filed December 31, 1912, Serial No. 739,521. Divided and this application filed October 31, 1914. Serial No. 869,694.

*To all whom it may concern:*

Be it known that I, FREDERICK JAMES EMPSON, a subject of the King of Great Britain, residing at Sydney, New South Wales, Australia, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention is for improvements in talking machines, phonographs and other automatic musical instruments, relating particularly to improved control means for regulating the expression valve means in such instruments; and is a division of my earlier application for United States patent Serial No. 739,521, filed December 31, 1912. In said musical instruments wherein expression effects are sought by the manipulation of a valve, I have discovered that the best effects musically are obtainable only when the valve control means possesses preferably both of the following characteristics: First, said control means should comprise an immediate operative connection with the expression valve so that its every adjustment by the performer, whether great or slight, smooth or sudden, in opening direction or closing, is instantly correspondingly communicated to the valve. Secondly, said control means should also be freely portable or adapted to be swayed, in spite of its said connection, so that it does not require the performer, in operating it, to assume or maintain any fixed relationship either to it or to the instrument. In other words, I have discovered that the eminently suitable control means for the expression valve means in automatic musical instruments should comprise a freely portable handle having parts which in the hands of the performer are delicately adjustable relative to each other with an immediate flexible operative connection to the expression valve, whereby every kind of adjustment of the handle parts on each other immediately adjusts said valve appropriately and whereby the performer, because not compelled to maintain any definite position, is free to move rhythmically with the music without in the slightest losing or jeopardizing his control of the handle or bringing about any undesired adjustment of its parts or of the valve due to said sympathetic movements of the hands, arms, or body generally.

The accompanying drawing shows diagrammatically an embodiment of my invention in connection with a phonograph or talking machine, the parts being shown broken away and in section.

In said drawing the base of the tone arm 1 and the neck of the horn 2 are indicated by the dotted lines.

3 is a horizontal part of the casing of the instrument or a shelf or partition therein.

The means enabling the performer to impart his own expression to the playing of the instrument comprises:—an expression valve A, and the control means therefor comprising a portable two-part handle B and the immediate flexible operating connection C from said handle to said valve.

The illustrated valve means A, forming more particularly the subject matter of my other above identified application, may be briefly described here as comprising a rubber throat 4 having a thin lip 5 and a basal flange 6, the latter supporting the throat in the neck of the horn by being clamped between the ring 8 and the flanged tube 7 that operatively supports the tone arm 1.

9 is a convexly domed valve, preferably made also of soft flexible rubber, supported at the mouth of the throat for adjustment axially relative thereto. The valve is supported on the end of the endwise slidable wire 10 which in turn is supported and guided by the flexible hollow sheath 11. This sheath, freely portable at its outer end or rather, adapted to be swayed, is made fast at its inner end within a vertical opening formed in the bottom of an open cage 12 consisting of bent-up strips secured to the ring 8.

The two-part handle B consists of the hollow outer part 13 and the contained rod-like inner part 14 adjustable in the hands of the performer telescopically with respect to each other. The part 14 has an exposed head 15 and at its other end is secured to the slidable wire 10. The end 16 of the hollow handle part 13 is reduced for attachment as shown to the sheath 11. The result is that the handle B is immediately connected with the valve A by the flexible operating means C whereby the handle is freely, rhythmically portable or movable as an entirety, yet always with perfect control of its parts in the hands of the operator either



for adjustment or non-adjustment thereof as the case may be, every adjustment of said parts with respect to each other resulting in a sliding of the wire 10 in its sheath with  
 5 an immediate appropriate movement of the valve 9, large or small, fast or slow, and in either opening or closing direction at will.

17 is a coiled spring surrounding the wire between the end 16 of the handle-part 13 and the part 14, said spring being option-  
 10 ally provided to normally force the part 14 out of its fully telescoped position in the part 13 whereby the valve 9 is given normal tendency away from its closed or soft playing position.

18 is a pin projecting from the inner handle-part 14 to work in a longitudinal slot 19 in the outer handle-part 13 as said parts are being telescopically adjusted on each  
 20 other to impart expression to the playing; or said pin can be rotated into one or other of the side notches 20 to lock the handle-parts to each other and thereby maintain the valve in one certain position of adjust-  
 25 ment.

In the foregoing preferred embodiment of my invention it will be seen that the freely swayable, adjustable handle with the immediate flexible operating connection to the  
 30 expression device can itself be played upon as if it were a musical instrument like a violin, where every relative movement of the handle parts on each other, like the bow to the violin, produces its immediate effect;  
 35 and where that immediate control is not in the least impaired, but on the contrary vastly improved, by reason of the fact that the performer is perfectly free to sway the handle rhythmically with the music, like  
 40 the violinist his instrument, and, unconscious of everything except the music, can produce his effects with beautiful, almost instinctive, mastery and finesse.

What I claim is:

45 1. The combination in an automatic musical instrument having a sound conduit, of valve means therefor, and freely swayable operating means for said valve means comprising a manually operable portion and a  
 50 connection between it and the valve means whereby said valve means may be adjusted independently of and be unmodified by the swaying of said manual portion relatively to the valve means.

55 2. The combination in an automatic musical instrument having a sound conduit, of valve means therefor, and freely swayable mechanical operating means for said valve means comprising a manually operable portion and a connection between it and the  
 60 valve means whereby said valve means may be adjusted independently of and be unmodified by the swaying of said manual portion relatively to the valve means.

65 3. The combination in an automatic mu-

sical instrument of expression valve means, and freely swayable elongated, mechanical control means for said expression valve means adapted to be swayed sympathetically with the music without affecting the expres-  
 70 sion valve means.

4. The combination in an automatic musical instrument having a sound conduit, of valve means therefor, and freely swayable  
 75 mechanical operating means for said valve means comprising a manually operable portion and a connection between it and the valve means whereby said valve means may be adjusted independently of and be un-  
 80 modified by the swaying of the manual portion relatively to the valve means, and means on the aforesaid manual portion for releasably holding the valve means in different positions of adjustment.

5. The combination in an automatic musical instrument having a sound conduit, of  
 85 a throat mounted within said conduit so that the sound must pass therethrough, and a plug valve coöperating axially with the throat opening, and freely swayable oper-  
 90 ating means for said valve means comprising a manually operable portion and a connection between it and the valve means whereby said valve means may be adjusted independ-  
 95 ently of and be unmodified by the swaying of the manual portion relatively to the valve means.

6. The combination in an automatic musical instrument having a sound conduit, of  
 100 a yielding throat mounted within said conduit so that the sound must pass there-  
 through, and a plug valve coöperating axially with the throat opening, and freely  
 105 swayable operating means for said valve means comprising a manually operable portion and a connection between it and the valve means whereby said valve means may be adjusted independently of and be un-  
 110 modified by the swaying of the manual portion relatively to the valve means.

7. The combination in an automatic musical instrument having a sound conduit, of  
 115 a tubular elastic throat mounted within said conduit so as to extend in the direction of the delivery of sound through the conduit, and a plug valve coöperating axially with the delivery end of the throat, and freely  
 120 swayable operating means for said valve means comprising a manually operable portion and a connection between it and the valve means whereby said valve means may be adjusted independently of and be un-  
 125 modified by the swaying of the manual portion relatively to the valve means.

8. The combination in an automatic musical instrument having a sound conduit, of  
 130 a tapering tubular elastic throat mounted within said conduit with its larger portion secured to the interior of the conduit and with its smaller, mouth portion extending

in the direction of the delivery of sound through the conduit, and a plug valve supported for axial movement at said mouth of the throat, and freely swayable operating means for said valve means comprising a manually operable portion and a connection between it and the valve means whereby said valve means may be adjusted independently of and be unmodified by the swaying of the manual portion relatively to the valve means.

9. The combination in an automatic musical instrument of a tone-arm and an amplifying horn, an internal tubular yielding throat extending from about the basal end of the tone-arm into the neck of the horn, a plug valve in the neck of the horn cooperating axially with said throat, and freely swayable operating means for said valve means comprising a manually operable portion and a connection between it and the valve means whereby said valve means may

be adjusted independently of and be unmodified by the swaying of the manual portion relatively to the valve means.

10. The combination in an automatic musical instrument of an expression valve and a control therefor comprising a two part handle whose parts are operable relatively to each other, and an elongated, flexible mechanical operating connection, one end of said connection being operatively related to the expression valve, said connection at its other end being freely swayable in the hands of the operator, and bearing said handle at said end operatively connected thereto.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK JAMES EMPSON.

Witnesses:

OSCAR F. GUNN,

JOSEPH F. MEADE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-RECORD.

1,158,659.

Specification of Letters Patent.

Patented Nov. 2, 1915.

No Drawing.

Application filed March 3, 1909. Serial No. 481,167.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Records, of which the following is a description.

My invention has for its object the production of an improved composition capable of existing in a molten state and having sufficient fluidity to be molded into a phonograph record preferably by the centrifugal process, and capable of hardening and shrinking when cooled to enable the record to be removed from the mold, said molded record being of great hardness and toughness so as to adapt it to resist wear to a greater extent than any moldable compositions previously known, whereby records having a record groove with four hundred threads to the inch can be successfully made.

The improved composition is formed by the employment of shellac and a solvent therefor or agent for rendering the same sufficiently fluid, solid at ordinary temperatures and melting to a mobile liquid at such low temperature that no decomposition either of itself or the shellac takes place, thus avoiding gas bubbles. The liquid so formed may be poured into a heated tubular mold which is rapidly rotated to form the record. The mold is then cooled, whereupon the record solidifies and eventually contracts so that it may be removed from the mold, or the record may be removed by a collapsing process without chilling.

I have found a number of solvents or agents for rendering the shellac sufficiently fluid to make good molded records, some of these compositions resulting in the formation of amorphous records and others resulting in the formation of crystalline records, as will hereafter be more fully set forth. The best agent which I have found for making amorphous shellac records is diphenylamin (melting point 54° C.). Fifteen parts of this ingredient are melted and seventy parts of shellac added thereto with vigorous stirring until all is dissolved. When the heat is properly regulated, the liquid resembles molasses and is somewhat filled with air bubbles. If, now, two parts of acetanilid are added, the liquid becomes

clear and more limpid when it is ready for use.

The second best record composition of this character is formed from stearic acid (melting point 68° C.) and shellac. The very highest grade of very crystalline stearic acid is used, this being melted and shellac added in successive portions until the proper degree of fluidity for pouring and molding is attained. The best results with stearic acid would seem to be secured with about fifteen parts of stearic acid to fifty to sixty parts of shellac with a small quantity of acetanilid to make the molten mixture more limpid. The proportions here given will vary with the quality of the shellac used, as there are many different brands and variations of the shellac. Such a composition, when molded into a record, is nearly the same as shellac as to hardness, but is tougher and resists wear better. Quite good results can be obtained with other proportions, as the proportion of about fifteen parts of stearic acid to thirty parts of shellac, and to this, say one part of acetanilid may be advantageously added to render the mixture more limpid. The compound obtained by dissolving the shellac in diphenylamin is harder than the compositions formed of shellac and stearic acid in the different proportions, and is, as I have stated, the composition that I consider the best for making the noncrystalline species of my invention.

When the proportion of shellac in the shellac and stearic acid composition is decreased, as for instance, fifteen parts of stearic acid to twenty-six parts of shellac, the molten material is still amorphous, but it is not so hard as shellac or as the different compositions just described, and it is not so desirable as the latter. As the proportion of shellac is still further reduced, as for example, fifteen parts of stearic acid to twenty-two to twenty-four parts of shellac, a composition is formed wherein the stearic acid crystallizes out after it solidifies, provided the liquid composition is kept at the lowest possible temperature and the operation is continued for not too long a time. This composition is also a highly desirable one and very well adapted for the molding of phonograph records. It must be used as soon as made, as it loses its properties of crystallization and hardness if kept long in



a molten condition. This composition is specifically claimed in another application, Serial No. 481,168, filed on even date herewith, this application claiming the invention generically and also claiming the amorphous species of the invention.

As has been shown, by varying the relative proportions of the agent for rendering the shellac more fluid and the shellac, I obtain two distinct materials or compositions which vary widely in their character, both of which, however, are remarkably well adapted for the manufacture of phonograph records by a molding process such as I have referred to.

Another desirable solvent which I have found for the shellac in this connection is solid naphthalene (melting point 80° C.). This is melted and the shellac is stirred into the liquid. The naphthalene seems to be equivalent to the stearic acid when used for mixture with the shellac, and the treatment is the same in the case of naphthalene as when the stearic acid is used. The same proportions of naphthalene may be used as in the case of stearic acid and shellac. The hardness of the composition will increase as the shellac increases, but a point is eventually reached, if the shellac content is progressively increased, when the liquid is too thick to be used practically. I prefer to use stearic acid to the solid naphthalene on account of the somewhat objectionable odor of the latter.

The crystalline record described may be formed by the mixture with the shellac of stearic acid or solid naphthalene or equivalents in proper proportion. When such a record is formed, it gradually changes color from a dark to a light yellow and the hardness and toughness increase. This is apparently because of a gradual change of the stearic acid or naphthalene from the amorphous state to the crystalline. There is a segregation of the stearic acid or naphthalene, the product after this change being tough and nearly as hard as celluloid, being even harder than the non-crystalline records, whose production has been described above. When fifteen parts of stearic acid or equivalent and only twenty-two to twenty-four parts of shellac are used, the shellac being dissolved in the melted stearic acid and the temperature kept very low, not above 240 degrees F., there is no solvent action as is the case in the formation of the amorphous records, but an emulsion is formed of the shellac and the molten stearic acid. Before pouring the record, the liquid is stirred. On cooling, the stearic acid crystallizes out and leaves the shellac as a net work. If, however, the temperature is raised too high, or the mixture is cooked for too long a time, there is a gradual solution of the shellac in the molten material and the stearic acid

loses the property of crystallizing out of the mixture. In the crystalline record formed as above described, much less shellac is used than in the amorphous record, and it is, therefore, very much cheaper.

There are other substances which can be substituted for the diphenylamin, stearic acid or naphthalene for rendering the shellac fluid and capable of being molded into desirable phonograph records which materials are equivalent to stearic acid and naphthalene, but they are more expensive and therefore not so practical in commercial work. Among these substances are acetanilid and benzoic acid.

If melted camphor is used as a solvent for the shellac, there is no such change by crystallization or segregation as occurs when the stearic acid or naphthalene is used with the shellac in an emulsion, and the material formed is very easily deformable by heat.

Instead of molding the record as described above, paper may be coated with the composition, and the record thus formed. For example, paper may be passed through the liquid and wound tightly into a cylinder of the proper size. This is then cooled, and over it is coated a thicker layer of the material as by dipping the cylinder therein. Finally, the paper cylinder is placed in a mold and subjected to heat and hydraulic pressure, whereby the record is impressed on the outer surface. After cooling, the cylinder is removed from the matrix.

Having now described my invention, what I claim and desire to secure by Letters Patent is as follows:

1. A phonograph record comprising shellac and diphenylamin, substantially as described.
2. A phonograph record comprising shellac and diphenylamin and an agent for making the composition clearer, substantially as described.
3. A phonograph record comprising shellac and diphenylamin in the proportion of approximately fifteen parts of diphenylamin to approximately seventy parts of shellac, substantially as described.
4. A phonograph record comprising shellac, diphenylamin and acetanilid in the proportion of approximately fifteen parts of diphenylamin, seventy parts of shellac and two parts of acetanilid, substantially as described.
5. A phonograph record comprising shellac and a solvent therefor which is crystalline at ordinary temperatures and constitutes more than fifty per cent. by weight of the record composition, substantially as described.
6. As an article of manufacture, a phonograph record comprising a mixture of approximately 70 parts of shellac and 15 parts of a solvent for shellac which is solid and

crystalline at ordinary temperatures, and a clearing agent in sufficient amount to clear the mixture, substantially as described.

7. As an article of manufacture, a phonograph record comprising approximately 70 parts of shellac, 15 parts of a solvent for shellac which is solid and crystalline at ordinary temperatures and which melts at such a low temperature that no decomposition of the shellac takes place, and a clearing agent in sufficient amount to clear the mixture, substantially as described.

8. A phonograph record comprising shellac and a solvent therefor which is crystal-

line at ordinary temperatures and melts at a temperature at which substantially no decomposition of the shellac takes place, the shellac being present in excess of said solvent and constituting more than 50% by weight of the record composition, substantially as described.

This specification signed and witnessed this 2nd day of March 1909.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,  
DYER SMITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



<p>1. The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science.</p>	<p>2. The second part of the paper is devoted to a detailed discussion of the various theories of the origin of life. It is shown that the most plausible theory is that of the spontaneous generation of life from non-living matter.</p>
<p>3. The third part of the paper is devoted to a discussion of the evidence in favor of the spontaneous generation of life. It is shown that the evidence is very strong and that it is in complete agreement with the theory of spontaneous generation.</p>	<p>4. The fourth part of the paper is devoted to a discussion of the objections to the theory of spontaneous generation. It is shown that the objections are all unfounded and that the theory is completely correct.</p>
<p>5. The fifth part of the paper is devoted to a discussion of the implications of the theory of spontaneous generation. It is shown that the theory has far-reaching implications for our understanding of the origin of life and for the history of the earth.</p>	<p>6. The sixth part of the paper is devoted to a discussion of the future of the theory of spontaneous generation. It is shown that the theory is still in need of further investigation and that it is likely to be confirmed in the future.</p>
<p>7. The seventh part of the paper is devoted to a discussion of the conclusions of the paper. It is shown that the theory of spontaneous generation is the most plausible theory of the origin of life and that it is in complete agreement with the evidence.</p>	<p>8. The eighth part of the paper is devoted to a discussion of the bibliography. It is shown that the bibliography is very extensive and that it covers a wide range of subjects.</p>
<p>9. The ninth part of the paper is devoted to a discussion of the acknowledgments. It is shown that the author wishes to thank the following persons for their assistance and advice:</p>	<p>10. The tenth part of the paper is devoted to a discussion of the references. It is shown that the references are very numerous and that they cover a wide range of subjects.</p>
<p>11. The eleventh part of the paper is devoted to a discussion of the appendix. It is shown that the appendix is very extensive and that it covers a wide range of subjects.</p>	<p>12. The twelfth part of the paper is devoted to a discussion of the index. It is shown that the index is very extensive and that it covers a wide range of subjects.</p>
<p>13. The thirteenth part of the paper is devoted to a discussion of the conclusion. It is shown that the conclusion is very strong and that it is in complete agreement with the evidence.</p>	<p>14. The fourteenth part of the paper is devoted to a discussion of the summary. It is shown that the summary is very extensive and that it covers a wide range of subjects.</p>
<p>15. The fifteenth part of the paper is devoted to a discussion of the abstract. It is shown that the abstract is very extensive and that it covers a wide range of subjects.</p>	<p>16. The sixteenth part of the paper is devoted to a discussion of the introduction. It is shown that the introduction is very extensive and that it covers a wide range of subjects.</p>
<p>17. The seventeenth part of the paper is devoted to a discussion of the first chapter. It is shown that the first chapter is very extensive and that it covers a wide range of subjects.</p>	<p>18. The eighteenth part of the paper is devoted to a discussion of the second chapter. It is shown that the second chapter is very extensive and that it covers a wide range of subjects.</p>
<p>19. The nineteenth part of the paper is devoted to a discussion of the third chapter. It is shown that the third chapter is very extensive and that it covers a wide range of subjects.</p>	<p>20. The twentieth part of the paper is devoted to a discussion of the fourth chapter. It is shown that the fourth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>21. The twenty-first part of the paper is devoted to a discussion of the fifth chapter. It is shown that the fifth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>22. The twenty-second part of the paper is devoted to a discussion of the sixth chapter. It is shown that the sixth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>23. The twenty-third part of the paper is devoted to a discussion of the seventh chapter. It is shown that the seventh chapter is very extensive and that it covers a wide range of subjects.</p>	<p>24. The twenty-fourth part of the paper is devoted to a discussion of the eighth chapter. It is shown that the eighth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>25. The twenty-fifth part of the paper is devoted to a discussion of the ninth chapter. It is shown that the ninth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>26. The twenty-sixth part of the paper is devoted to a discussion of the tenth chapter. It is shown that the tenth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>27. The twenty-seventh part of the paper is devoted to a discussion of the eleventh chapter. It is shown that the eleventh chapter is very extensive and that it covers a wide range of subjects.</p>	<p>28. The twenty-eighth part of the paper is devoted to a discussion of the twelfth chapter. It is shown that the twelfth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>29. The twenty-ninth part of the paper is devoted to a discussion of the thirteenth chapter. It is shown that the thirteenth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>30. The thirtieth part of the paper is devoted to a discussion of the fourteenth chapter. It is shown that the fourteenth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>31. The thirty-first part of the paper is devoted to a discussion of the fifteenth chapter. It is shown that the fifteenth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>32. The thirty-second part of the paper is devoted to a discussion of the sixteenth chapter. It is shown that the sixteenth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>33. The thirty-third part of the paper is devoted to a discussion of the seventeenth chapter. It is shown that the seventeenth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>34. The thirty-fourth part of the paper is devoted to a discussion of the eighteenth chapter. It is shown that the eighteenth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>35. The thirty-fifth part of the paper is devoted to a discussion of the nineteenth chapter. It is shown that the nineteenth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>36. The thirty-sixth part of the paper is devoted to a discussion of the twentieth chapter. It is shown that the twentieth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>37. The thirty-seventh part of the paper is devoted to a discussion of the twenty-first chapter. It is shown that the twenty-first chapter is very extensive and that it covers a wide range of subjects.</p>	<p>38. The thirty-eighth part of the paper is devoted to a discussion of the twenty-second chapter. It is shown that the twenty-second chapter is very extensive and that it covers a wide range of subjects.</p>
<p>39. The thirty-ninth part of the paper is devoted to a discussion of the twenty-third chapter. It is shown that the twenty-third chapter is very extensive and that it covers a wide range of subjects.</p>	<p>40. The fortieth part of the paper is devoted to a discussion of the twenty-fourth chapter. It is shown that the twenty-fourth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>41. The forty-first part of the paper is devoted to a discussion of the twenty-fifth chapter. It is shown that the twenty-fifth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>42. The forty-second part of the paper is devoted to a discussion of the twenty-sixth chapter. It is shown that the twenty-sixth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>43. The forty-third part of the paper is devoted to a discussion of the twenty-seventh chapter. It is shown that the twenty-seventh chapter is very extensive and that it covers a wide range of subjects.</p>	<p>44. The forty-fourth part of the paper is devoted to a discussion of the twenty-eighth chapter. It is shown that the twenty-eighth chapter is very extensive and that it covers a wide range of subjects.</p>
<p>45. The forty-fifth part of the paper is devoted to a discussion of the twenty-ninth chapter. It is shown that the twenty-ninth chapter is very extensive and that it covers a wide range of subjects.</p>	<p>46. The forty-sixth part of the paper is devoted to a discussion of the thirtieth chapter. It is shown that the thirtieth chapter is very extensive and that it covers a wide range of subjects.</p>

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH-RECORD.

1,158,660.

Specification of Letters Patent.

Patented Nov. 2, 1915.

No Drawing.

Application filed March 3, 1909. Serial No. 481,168.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Records, of which the following is a description.

My invention has for its object the production of an improved composition capable of existing in a molten state and having sufficient fluidity to be molded into a phonograph record preferably by the centrifugal process, and capable of hardening and shrinking when cooled to enable the record to be removed from the mold, said molded record being of great hardness and toughness so as to adapt it to resist wear to a greater extent than any moldable compositions previously known, whereby records having a record groove with four hundred threads to the inch can be successfully made.

The improved composition is formed by the employment of shellac and a solvent therefor or agent for rendering the same sufficiently fluid, solid at ordinary temperatures and melting to a mobile liquid at such low temperature that no decomposition either of itself or the shellac takes place, thus avoiding gas bubbles. The liquid so formed may be poured into a heated tubular mold which is rapidly rotated to form the record. The mold is then cooled, whereupon the record solidifies and eventually contracts so that it may be removed from the mold, or the record may be removed by a collapsing process without chilling.

I have found a number of solvents or agents for rendering the shellac sufficiently fluid to make good molded records, some of these compositions resulting in the formation of amorphous records and others resulting in the formation of crystalline records, as will hereafter be more fully set forth. The best agent which I have found for making amorphous shellac records is diphenylamin. Fifteen parts of this ingredient are melted and seventy parts of shellac added thereto with vigorous stirring until all is dissolved. When the heat is properly regulated, the liquid resembles molasses and is somewhat filled with air bubbles. If, now, two parts of acetanilid are added, the liquid

becomes clear and more limpid when it is ready for use.

The second best record composition of this character is formed from stearic acid and shellac. The very highest grade of very crystalline stearic acid is used, this being melted and shellac added in successive portions until the proper degree of fluidity for pouring and molding is attained. The best results with stearic acid would seem to be secured with about fifteen parts of stearic acid to fifty to sixty parts of shellac with a small quantity of acetanilid to make the molten mixture more limpid. The proportions here given will vary with the quality of the shellac used, as there are many different brands and variations of the shellac. Such a composition, when molded into a record, is nearly the same as shellac as to hardness, but is tougher and resists wear better. Quite good results can be obtained with other proportions, as the proportion of about fifteen parts of stearic acid to thirty parts of shellac, and to this, say one part of acetanilid may be advantageously added to render the mixture more limpid. The compound obtained by dissolving the shellac in diphenylamin is harder than the compositions formed of shellac and stearic acid in the different proportions, and is, as I have stated, the composition that I consider the best for making the non-crystalline species of my invention.

When the proportion of shellac in the shellac and stearic acid composition is decreased, as for instance, fifteen parts of stearic acid to twenty-six parts of shellac, the molten material is still amorphous, but it is not so hard as shellac or as the different compositions just described, and it is not so desirable as the latter. As the proportion of shellac is still further reduced, as for example, fifteen parts of stearic acid to twenty-two to twenty-four parts of shellac, a composition is formed wherein the stearic acid crystallizes out after it solidifies, provided the liquid composition is kept at the lowest possible temperature and the operation is continued for not too long a time. This composition is also a highly desirable one and very well adapted for the molding of phonograph records. It must be used as soon as made, as it loses its properties of crystallization and hardness if kept long in



a molten condition. The present application is directed to the crystalline species of my invention, the invention being broadly claimed in another application, Serial No. 481,167, filed on even date herewith.

As has been shown, by varying the relative proportions of the agent for rendering the shellac more fluid and the shellac, I obtain two distinct materials or compositions which vary widely in their character, both of which, however, are remarkably well adapted for the manufacture of phonograph records by a molding process such as I have referred to. Another desirable solvent which I have found for the shellac in this connection is solid naphthalene. This is melted and the shellac is stirred into the liquid. The naphthalene seems to be equivalent to the stearic acid when used for mixture with the shellac, and the treatment is the same in the case of naphthalene as when the stearic acid is used. The same proportions of naphthalene may be used as in the case of stearic acid and shellac. The hardness of the composition will increase as the shellac increases, but a point is eventually reached, if the shellac content is progressively increased, when the liquid is too thick to be used practically. I prefer to use stearic acid to the solid naphthalene on account of the somewhat objectionable odor of the latter.

The crystalline record described may be formed by the mixture with the shellac of stearic acid or solid naphthalene or equivalents in proper proportion. When such a record is formed, it gradually changes color from a dark to a light yellow and the hardness and toughness increase. This is apparently because of a gradual change of the stearic acid or naphthalene from the amorphous state to the crystalline. There is a segregation of the stearic acid or naphthalene, the product after this change being tough and nearly as hard as celluloid, being even harder than the non-crystalline records, whose production has been described above. When fifteen parts of stearic acid or equivalent and only twenty-two to twenty-four parts of shellac are used, the temperature being kept very low, not above 240 degrees F., there is no solvent action as is the case in the formation of the amorphous records, but an emulsion is formed of the shellac and the molten stearic acid. Before pouring the record, the liquid is stirred. On cooling, the stearic acid crystallizes out and leaves the shellac as a net work. If, however, the temperature is raised too high, or the mixture is cooked for too long a time, there is a gradual solution of the shellac in the molten material and the stearic acid loses the property of crystallizing out of the mixture. In the

crystalline record formed as above described, much less shellac is used than in the amorphous record, and it is, therefore, very much cheaper.

There are other substances which can be substituted for the diphenylamin, stearic acid or naphthalene for rendering the shellac fluid and capable of being molded into desirable phonograph records which materials are equivalent to stearic acid and naphthalene, but they are more expensive and therefore not so practical in commercial work. Among these substances are acetanilid and benzoic acid.

If melted camphor is used as a solvent for the shellac, there is no such change by crystallization or segregation as occurs when the stearic acid or naphthalene is used with the shellac in an emulsion, and the material formed is very easily deformable by heat.

Instead of molding the record as described above, paper may be coated with the composition, and the record thus formed. For example, paper may be passed through the liquid and wound tightly into a cylinder of the proper size. This is then cooled, and over it is coated a thicker layer of the material as by dipping the cylinder therein. Finally, the paper cylinder is placed in a mold and subjected to heat and hydraulic pressure, whereby the record is impressed on the outer surface. After cooling, the cylinder is removed from the matrix.

Having now described my invention, what I claim and desire to secure by Letters Patent is as follows:

1. A phonograph record comprising shellac and a crystalline substance emulsified with shellac in the formation of the composition, the said substance being solid at ordinary temperatures and acting to render the shellac more fluid when mixed therewith in a melted condition, substantially as described.

2. A phonograph record comprising shellac and stearic acid in the proportion of approximately fifteen parts of stearic acid to twenty-two to twenty-four parts of shellac, substantially as described.

3. A phonograph record comprising shellac and crystallized and segregated stearic acid, substantially as described.

4. A phonograph record comprising a network of shellac surrounded by crystallized stearic acid or its equivalent, substantially as described.

This specification signed and witnessed this 2nd day of March 1909.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,  
DYER SMITH.



GRAPHOPHONE PATENT.

PHONOGRAPH,

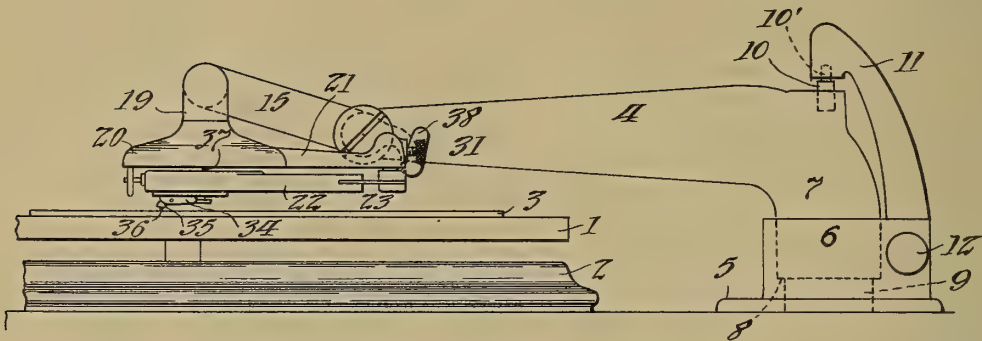
# 1,158,661-----Thos. A. Edison,  
Patented-November 2nd, 1915.  
Filed-September 16th, 1912.

T. A. EDISON.  
 PHONOGRAPH OR TALKING MACHINE.  
 APPLICATION FILED SEPT. 16, 1912.

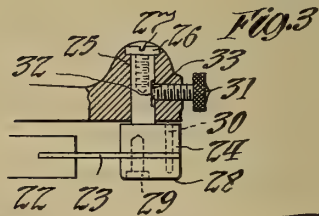
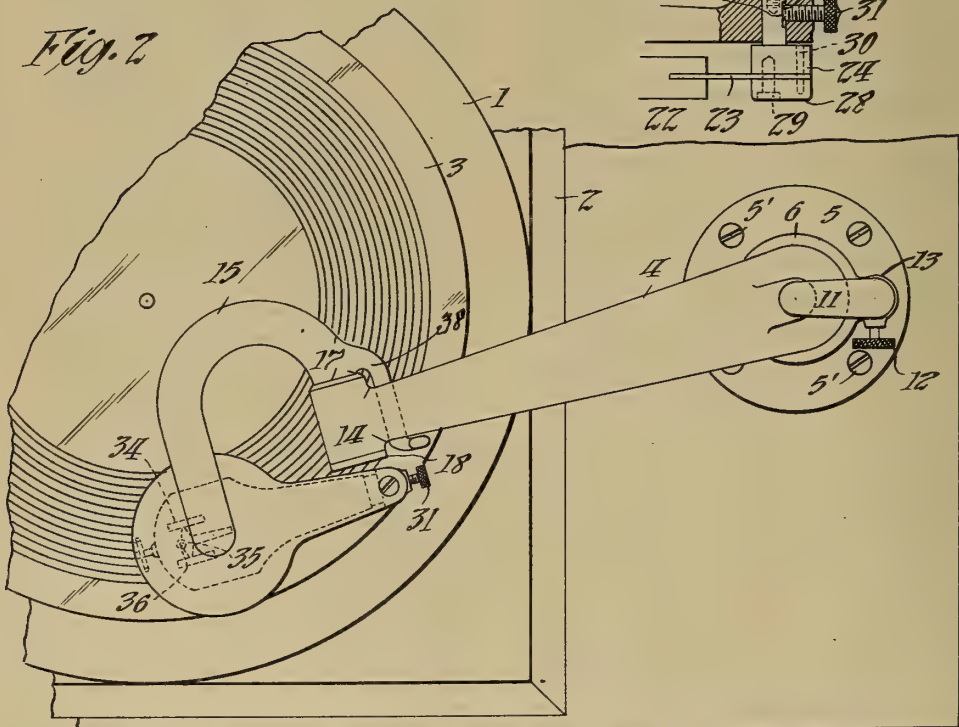
1,158,661.

Patented Nov. 2, 1915.

*Fig. 1*



*Fig. 2*



*Witnesses:*

*Frank Lewis*  
*Frederick Bachmann*

*Inventor:*

*Thomas A. Edison*  
*by Frank L. Lewis*  
*his Atty.*

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH OR TALKING-MACHINE.

1,158,661.

Specification of Letters Patent. Patented Nov. 2, 1915.

Application filed September 16, 1912. Serial No. 720,473.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs or Talking-Machines, of which the following is a description.

My invention relates to phonographs or talking machines, and my principal object is to provide an improved construction whereby reproducers adapted to operate upon sound records having record grooves of the up and down or hill and dale type, and more particularly reproducers provided with floating weights carrying the reproducer styluses, are adapted to be fed across the record surface by the coaction of the reproducer stylus and the record groove.

Another object of my invention is to provide an improved mounting for reproducers of the type specified above whereby they may be readily moved into and out of operative position or held in proper operative position with respect to the record.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 is a side elevation of a portion of a phonograph or talking machine embodying one form of my invention; Fig. 2 is a partial plan view of the same; and Fig. 3 is a view partly in side elevation and partly in section of a detail of construction.

In all of the views like parts are designated by the same reference numerals.

Referring to the drawing, the numeral 1 designates the ordinary rotatable turntable supported above the top 2 of a phonograph or talking machine cabinet of any desired construction and adapted to support a disk sound record 3. The numeral 4 designates a movable tapered sound conveying arm of usual construction, this arm being mounted so as to be capable of free and unrestricted movement only in a direction substantially parallel to the top of the turntable 1 and the upper surface of the record 3.

The mounting of the sound conveying arm 4 herein disclosed comprises a bearing 5 se-

cured, as by means of screws 5' to the top of the talking machine cabinet and provided with a vertical sleeve-like portion 6 within which the downwardly directed portion 7 of the sound conveying arm 4 at the larger end of the said arm is rotatably mounted, the bearing 5 being provided with a shoulder 8 on which the arm 4 is supported against downward movement. The bearing 5 is provided with an opening 9 registering with the outlet in the downwardly directed portion 7 of the arm 4 whereby the said arm may be placed in communication with a sound amplifying horn (not shown). A pivot 10 secured to the top of the arm 4 is provided with a reduced portion 10' rotatably mounted in a bracket 11 co-axially with the sleeve 6, the arm 11 being detachably secured, as by a set screw 12 in the socket 13 formed in the bearing 5. By reason of the above described mounting of the sound conveying arm 4, movement of the latter is practically limited to rotation in a horizontal direction about the axis of the pivot 10 and the sleeve 6. The forward or smaller end of the sound conveying arm 4 is provided with a collar or strap 14 communicating with the said arm, the axis of the said conveyer or strap extending transversely with respect to the axis of the said arm. The collar or strap 14 is adapted to receive and form a bearing or socket for one end of a substantially U-shaped tube or sound conveyer 15 which communicates with the sound conveying arm 3 when the reproducer is in operative position. The tube or sound conveyer 15 is held against axial movement in the collar or strap 14 by a circular flange 17 formed on the said tube or sound conveyer and engaging one end of said collar or strap and by a cap 18 secured upon the end of the said tube in the strap 14 and resting in engagement with the other end of the said strap. The free arm of the U-shaped tube or sound conveyer 15 is downwardly directed as shown at 19 (Fig. 1), the downwardly directed portion of the said arm being rigidly secured to and communicating with the neck of the reproducer.

Excepting the means hereinafter described for holding the floating weight against lateral movement with respect to the reproducer body, the construction of the reproducer herein disclosed is practically the same as



that disclosed in my United States Patent No. 1,055,621, dated March 11, 1913, and entitled reproducers. The said reproducer comprises a sound box 20 supporting the reproducer diaphragm (not shown) and provided with an extension 21 supporting the floating weight 22 by a connection comprising a leaf spring 23 rigidly secured, as by soldering, in a slot in one end of the floating weight and secured at its other end to a member 24 provided with a shank 25 rotatably mounted in the extension 21 of the sound box body. A headed member such as the bolt 26, is threaded in the top of the shank 25 and bears upon the bottom of a recess 27 in the extension 21 to hold the shank 25 against downward movement. A block or equivalent member 28 bearing against the under side of the spring 23 and secured to the member 24, as by a screw 29, serves with the said screw to secure the said spring to the member 24. A pin 30 passing through the member 24 and spring 23 and into the member 28 holds the spring against rotation or lateral movement with respect to the member 24. A set screw 31, or equivalent means is adjustable into engagement with the shank 25 to hold the latter and accordingly also the floating weight against lateral movement with respect to the sound box body. In order that the floating weight may be held in central position by engagement of the screw 31 and the shank 25, I preferably provide the latter with a transversely extending flattened surface 32, preferably a plane surface, adapted to be engaged by the end 33 of the screw 31, the said end of the screw being preferably cupped so as to provide a circular edge lying in one plane and capable of resting flatly against surface 32. The lower surface of the floating weight is provided with bearings 34 spaced a substantial distance apart between which the stylus lever 35 is pivotally mounted, the distance between these bearings being considerable; so that lateral angular movement of the stylus lever in its bearings is reduced to an inappreciable amount. A stylus 36 adapted to engage the record groove of the sound record 3 is firmly secured in one arm of the stylus lever, the other arm being connected, as by connection 37 to the reproducer diaphragm (not shown).

To limit the downward movement of the forward end of the tube or sound conveyer 15 and thereby hold the reproducer in operative position with respect to the record surface, I provide a rigid arm 38 formed on the tube or sound conveyer 15 and extending under and adapted to engage the lower side of the sound conveying arm 4. It is evident that the reproducer may be moved toward and away from the record by adjustment of the tube 15 in its bearing 14; so that records on the turntable 1 may be readily changed. It is also evident that while the tube 15 and

the sound box body 20 are maintained by the stop 38 a fixed distance from the surface of the turntable 1, the floating weight 22 and the reproducer stylus carried thereby are capable of movement toward and away from the said turntable and are thereby permitted to readily follow the irregularities in the record surface.

By clamping the set screw 31 against the surface 32 on the shank 25 to secure the floating weight against lateral movement, the reproducer may be fed across the record surface by the coaction of the reproducer stylus and the walls of the record groove, neither the stylus, the stylus lever, nor the floating weight being movable laterally with respect to the sound box body or the sound conveying arm 4. In the construction shown, the feeding of the reproducer, as just described, causes the conveyer 15 and the arm 4 to be moved with the reproducer in a circular path about the axis of the bearing 5 as a center. If it is desired to dispense with the feeding of the reproducer by the coaction of the reproducer stylus and the record groove and to employ mechanical feeding means, the set screw 31 may be loosened to a suitable extent to permit the reproducer stylus and floating weight to follow the lateral irregularities in the record groove.

Having now described my invention what I claim as new and desire to protect by Letters Patent is as follows:

1. In a phonograph or talking machine, the combination with a reproducer comprising a sound box body, a floating weight mounted thereon, a stylus lever carried by said weight, and a stylus carried by said lever, of a record support, a sound conveying arm connected to said reproducer, said reproducer being movable independently of said sound conveying arm toward and away from said support, and means for limiting the downward movement of said sound box body with respect to said arm and holding the same in operative position with respect to said floating weight and to a record carried by said support, said stylus being arranged to coact with the record groove to feed the reproducer across the record, substantially as described.

2. In a phonograph or talking machine, the combination with a reproducer comprising a sound box body, a floating weight connected thereto, a stylus lever carried by said weight, and a stylus carried by said lever, of a record support, a sound conveying arm having an extremity movable substantially parallel to said support, a connection between said reproducer and said extremity of said sound conveying arm permitting movement of said reproducer relatively to said arm toward and away from said support, and means coacting with said connection and arm for limiting the downward move-



ment of said sound box body with respect to said arm and holding the same in operative position with respect to said floating weight and to a record carried by said support; said stylus being arranged to coact with the record groove to feed the reproducer across the record, substantially as described.

3. In a phonograph or talking machine, the combination with a reproducer comprising a sound box body, a floating weight mounted thereon, a stylus lever carried by said weight and a stylus carried by said lever, of a record support, a sound conveying arm connected to said reproducer and immovable toward and away from said record support during the reproduction of a record, said reproducer being movable independently of said sound conveying arm toward and away from said support, and means for limiting the downward movement of said sound box body with respect to said arm and holding the same in operative position with respect to said floating weight and to a record carried by said support, substantially as described.

4. In a phonograph or talking machine, the combination with a reproducer comprising a sound box body, a floating weight mounted thereon, a stylus lever carried by said weight, and a stylus carried by said lever, of a record support, a sound conveying arm having an extremity movable invariably substantially parallel to said support, a connection between said reproducer and sound conveying arm permitting movement of said reproducer toward and away from said support, and means coacting with said connection and arm for positively limiting the downward movement of said sound box body with respect to said arm and holding the same in operative position with respect to said floating weight and to a record carried by said support, substantially as described.

5. In a phonograph or talking machine, the combination with a reproducer comprising a sound box body, a floating weight mounted thereon, a stylus lever carried by

said weight, and a stylus carried by said lever, of a record support, a sound conveying arm connected to said reproducer and immovable toward and away from said record support during the reproduction of a record, said reproducer being movable independently of said sound conveying arm toward and away from said support, and means for positively limiting the downward movement of said sound box body with respect to said arm and holding the same in operative position with respect to said weight and a record carried by said support, said stylus being immovable laterally with respect to said sound conveying arm, whereby said reproducer is adapted to be fed across the surface of the record by the coaction of the reproducer stylus and the record groove, substantially as described.

6. In a phonograph or talking machine, the combination with a reproducer comprising a sound box body, a floating weight mounted thereon, a stylus lever carried by said weight, and a stylus carried by said lever, of a record support, a sound conveying member having an extremity movable invariably substantially parallel to said support, a sound conveying member connecting said reproducer and said first named sound conveying member and permitting movement of said reproducer toward and away from said support, and means rigid with one of said sound conveying members and arranged to coact with the other of said sound conveying members to limit the downward movement of said sound box body with respect to said first named sound conveying member and to hold the same in operative position with respect to said floating weight and to a record carried by said support, substantially as described.

This specification signed and witnessed this 12th day of September 1912.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,  
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



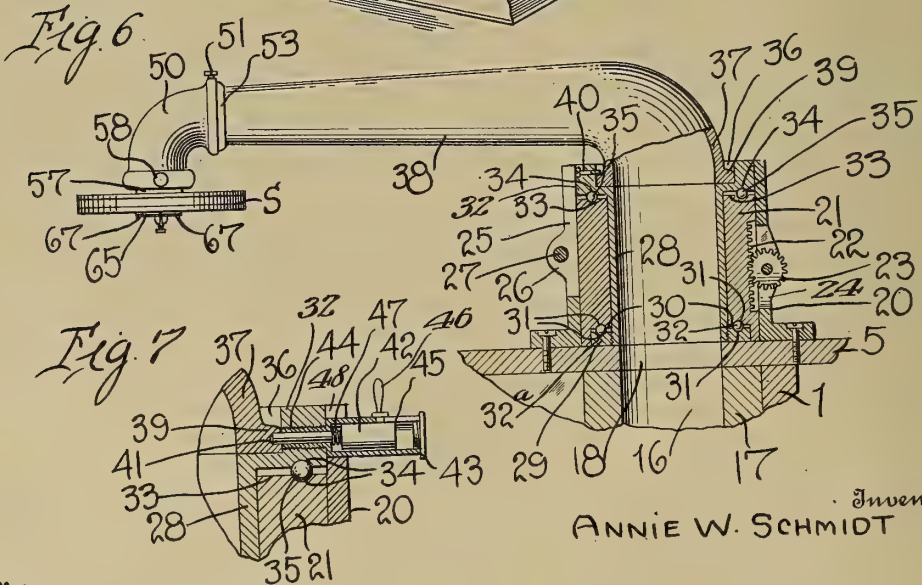
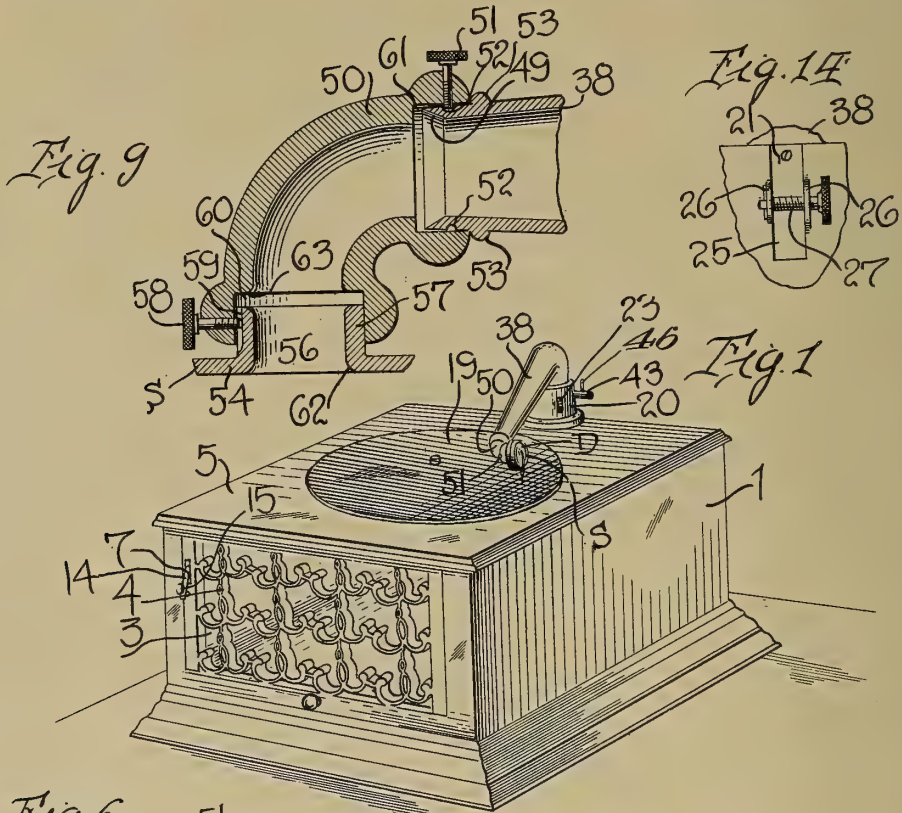


SOUND REPRODUCING MACHINE,  
# 1,158,728-----A. W. Schmidt,  
Patented-November 2nd, 1915.  
Filed-October 26th, 1914.

A. W. SCHMIDT.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED OCT. 26, 1914.

1,158,728.

Patented Nov. 2, 1915.  
2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

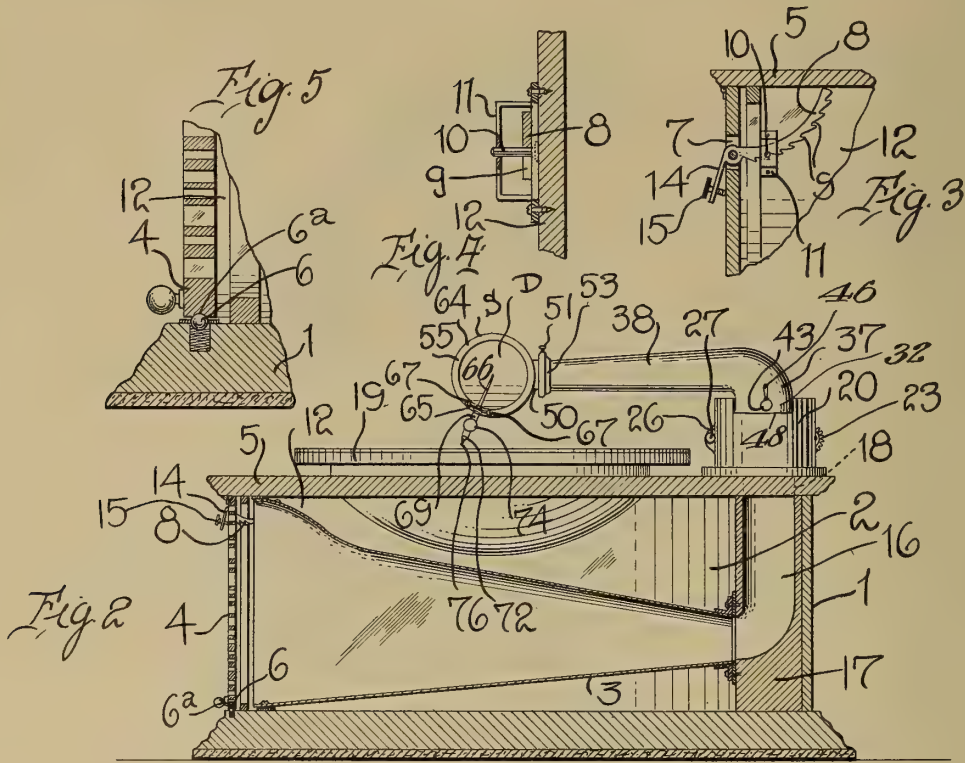


Fig. 15

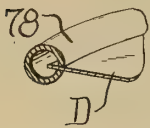


Fig. 11



Fig. 10

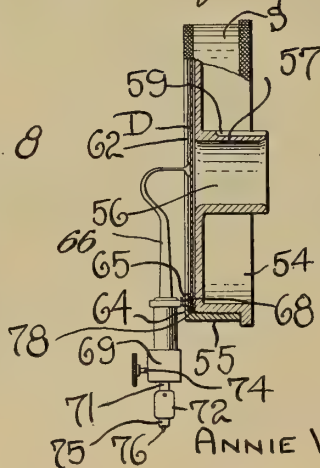


Fig. 13

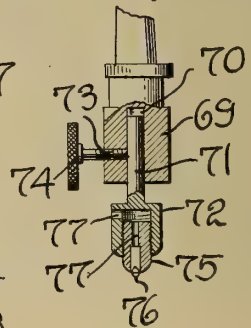


Fig. 12

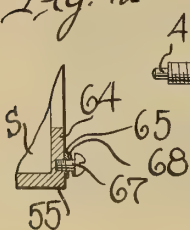
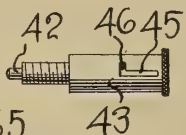


Fig. 8



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# UNITED STATES PATENT OFFICE.

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## SOUND-REPRODUCING MACHINE.

1,158,728.

Specification of Letters Patent.

Patented Nov. 2, 1915.

Application filed October 26, 1914. Serial No. 868,718.

*To all whom it may concern:*

Be it known that I, ANNIE W. SCHMIDT, a subject of the Emperor of Austria-Hungary, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to certain improvements in sound reproducing machines, and the object of my invention is to provide a device of this general character having novel and improved means whereby a reproduction of sound may be obtained with a maximum of tone quality and whereby the possibility of foreign sounds is substantially eliminated.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved machine whereby certain important advantages are attained and the device is rendered simpler, less expensive and otherwise more convenient and advantageous for use, all as will be hereinafter more fully set forth.

The novel features of the invention will be carefully defined in the appended claims.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein—

Figure 1 is a view in perspective of a reproducing machine constructed in accordance with an embodiment of my invention; Fig. 2 is a vertical sectional view taken through the casing or cabinet of my device as herein embodied, with the sound reproducing mechanism in elevation; Fig. 3 is an enlarged fragmentary sectional view illustrating the mechanism herein embodied for controlling the swinging side member or damper; Fig. 4 is an enlarged fragmentary detail view illustrating the keeper included in the locking mechanism disclosed particularly in Fig. 3; Fig. 5 is an enlarged fragmentary view illustrating in detail the locking means herein embodied for maintaining the swinging side member or damper in closed position; Fig. 6 is an enlarged view, partly in elevation and partly in section, of the sound reproducing mechanism as herein embodied; the sound box being shown adjusted to an inoperative position; Fig. 7 is an enlarged fragmentary view illustrating

the means for holding the supporting arm included in the sound reproducing mechanism against swinging movement; Fig. 8 is a view in elevation, with a part in section, of the locking member as disclosed in Fig. 7; Fig. 9 is an enlarged fragmentary sectional view of the elbow embodied in my present sound reproducing mechanism and illustrating the coacting parts in operative connection therewith; Fig. 10 is a view, partly in side elevation and partly in section, of the sound box as herein embodied; Fig. 11 is a view in perspective, detached, of the butterfly mounting employed in connection with the sound box; Fig. 12 is a detail sectional view of the sound box illustrating an anchoring means for the butterfly mounting; Fig. 13 is an enlarged fragmentary view, partly in elevation and partly in section, illustrating certain details of the stylus arm and stylus member; Fig. 14 is a fragmentary detail view illustrating the means for expanding or contracting the barrel as herein embodied; and Fig. 15 is a fragmentary perspective view, on an enlarged scale, illustrating the tube mounting for the diaphragm.

As disclosed in the accompanying drawings, 1 denotes a cabinet of predetermined dimensions and configuration provided with a chamber 2 in which is mounted a horn member 3, the outer end of which terminates in close proximity to one side or damper 4 of the casing and is substantially oval in form. The side or damper 4 of the casing is formed of fretwork and has its upper longitudinal edge pivotally engaged with the top portion 5 of the casing and is maintained in closed position, as herein embodied and particularly shown in Fig. 5, through the medium of the spring controlled ball 6 adapted to be accommodated within a suitable socket 6<sup>a</sup> suitably produced in the under edge of the side or damper 4. As is believed to be self-evident, the raising of the side or damper 4 controls the volume of sound emitted and in order that the side or damper 4 may be effectively maintained in its different adjustments, I pivotally mount within a suitable slot 7 produced in an end marginal portion of said damper 4 the inwardly directed segmental member 8, the lower edge of which is provided with inwardly disposed teeth 9 adapted to coact with the pin 10 carried by the keeper 11 suitably secured to the adjacent end wall 12



of the cabinet 1, as is believed to be particularly shown in Figs. 3 and 4. I also find it of advantage to have the pivoted extremity of the member 8 provided with an angular extension 14 adapted to overlies the outer face of the side or damper 4 and having threaded therethrough the screw member 15 adapted to engage the outer face of the damper 4.

The inner or small end of the horn is in communication with the vertically disposed bore 16 produced in the block 17 suitably mounted within the chamber 2 at the rear thereof and at substantially midway thereof, said bore 16 being also in communication with an opening in the top 5 of the cabinet, as indicated by dotted lines at 18 in Fig. 2. Positioned above the top portion 5 of the cabinet and at substantially the axial center thereof is the rotatable table 19 of conventional construction and on which a record disk is adapted to be positioned.

Secured to the top portion 5 of the cabinet and surrounding the opening 18 is a barrel 20 in which is positioned a tubular member 21 provided with the longitudinally directed rack 22 with which is adapted to mesh the pinion 23 operatively supported within the slot or opening 24 produced in the barrel 20 and whereby it will be readily perceived that the tubular member 21 may be readily and conveniently raised when the requirements of practice so necessitate, it being understood that the pinion 23 may be readily rotated by the finger.

Diametrically opposed to the opening 24, the barrel 20 is provided with a longitudinally disposed open ended slot 25 extending a predetermined distance therealong and the marginal portions of the barrel afforded by the open ended slot 25 are provided with the outstanding perforate ears 26, one of which is screw-threaded for the passage therethrough of the headed threaded member 27, the extremity thereof being reduced and smooth and having a swivel engagement with the coacting ear 26. By this arrangement, it will be readily seen that the barrel 20 may be contracted to clamp the tubular member 21 in its differing adjustments therein and expanded to readily permit such adjustment being obtained. Disposed within the tubular member 21 is the lower extremity of a sleeve 28 with which is detachably engaged an annular member 29 adapted to underlie the annular shoulder 30 on the tubular member 21 and the opposed faces of the annular member 29 and the shoulder 30 are provided with the raceways 31 in which are disposed the anti-friction members 32, herein disclosed as conventional ball bearings. The upper or outer extremity of the sleeve 28 is provided with an annular head 32 adapted to overlies the upper edge 33 of the tubular member 21 and the opposed faces

of said head 32 and upper edge 33 are provided with the race-ways 34 in which are disposed the anti-friction members 35 also herein disclosed as conventional ball bearings. In practice I have found it of advantage to have the head 32 integrally produced with the sleeve 28 and it will therefore be readily understood that the sleeve 28 will be operatively engaged with the tubular member 21 before said tubular member 21 is positioned within the barrel 20.

The head portion of the bore of the sleeve 28 is of increased diameter, as indicated at 36, in order to properly receive the angular portion 37 of the tubular supporting arm 38, the major portion thereof being adapted to be disposed over the rotatable table 19 and positioned in a plane substantially parallel to the plane occupied by said table.

The free extremity of the angular portion 37 of the arm 38 is provided with the annular flange 39 with which coacts the member 40, as is particularly shown in Fig. 6, threaded through the head 32 and overlying the flange 39 in order to maintain the arm 38 in assembled relation. In order to maintain the arm 38 against swinging movement relatively to the sleeve 28, I provide the flange 39 at a predetermined point with the cavity 41 adapted to receive an extremity of the endwise movable member 42 mounted for reciprocating movement within the cylindrical casing 43 detachably engaged, as indicated at 44, with the head 32 of the sleeve 28. The cylindrical casing 43 is provided with a bayonet slot 45, as is believed to be particularly shown in Figs. 7 and 8, through which projects the operating member 46 connected with the endwise movable member 42 whereby it will be readily perceived that upon axial movement being imparted to the endwise movable member to the position as shown in Fig. 8, said member 42 will be locked in operative engagement with the arm 38 or more particularly the flange 39 thereof. The endwise movable member 42 is provided with an annular shoulder and interposed between said shoulder and the inner end of the casing and surrounding member 42 is the expansible member 47, herein disclosed as a conventional coil spring, possessing sufficient tension as to normally maintain the endwise movable member 42 in a retracted position so that the arm 38 is capable of swinging movement.

It is to be observed, as indicated at 48 in Fig. 7, that the upper marginal portion of the barrel 20 is cut-away in order to offer no obstruction to the axial rotation of the sleeve 28 when the arm 38 is operatively engaged with a record upon the supporting table 19.

The outer or horizontal portion of the arm 38, as herein disclosed, is tapering and the



free edge 49 thereof is beveled inwardly, and said outer extremity of the arm 38 is adapted to be disposed within the elbow 50 and maintained in operative connection there-  
 5 with through the medium of the set screw 51 threaded through the elbow and adapted to project within the annular groove 52 produced in the periphery of the arm 38 adjacent the outer extremity thereof. In order  
 10 that the set screw 51 may readily engage within the annular groove 52 when the elbow 50 is being applied, I provide the arm 38 with the annular flange 53 with which the adjacent extremity of the elbow is adapted  
 15 to contact. By providing the bevel 49, it will be perceived that no injurious obstruction or hindrance will be given to the sounds passing through the elbow and within the arm 38.

20 As herein disclosed, the sound box S comprises two sections 54 and 55 capable of detachable engagement and adapted to suitably retain the diaphragm D, the outer section 55 having its base substantially open  
 25 in order to permit the requisite action of the diaphragm. The inner section 54 is provided with a central opening 56 surrounded by the inwardly disposed sleeve 57 which is adapted to be projected within the  
 30 outer extremity of the elbow 50 and held therein through the medium of the set screw 58 threaded through the elbow and adapted to bear against the sleeve 57, and in order to positively hold the sound box S against  
 35 independent axial movement in a predetermined adjustment, I provide the sleeve 57 with the longitudinally disposed groove 59 into which the set screw 58 is adapted to be accommodated, as is believed to be clearly  
 40 shown in Fig. 9. I find it of advantage to have the groove 59 elongated in order that the sound box S may be adjusted relatively to the coacting extremity of the elbow 50, as the requirements of practice may dictate.  
 45 In order that the sleeve 57 may be properly positioned within the elbow, it is to be observed that the bore of the elbow at its outer extremity is enlarged, as at 60, while the opposite extremity of the bore of the  
 50 elbow is enlarged, as at 61, in order that the arm 38 may be properly engaged therewith. I also find it of advantage to have the outer marginal portion of the opening 56 of the section 54 rounded, as indicated at 62, and to also have the outer edge 63 of the shoulder  
 55 afforded by the enlarged portion 60 rounded so that interference with the passage of sound therethrough is substantially eliminated.

60 Operatively engaged with the base portion 64 of the section 55 of the sound box S is the butterfly mounting 65 for the stylus arm 66 also operatively engaged, in a conventional way, with the diaphragm D. As  
 65 herein embodied, the connection between the

mounting 65 and the base 64 is through the medium of the headed members 67 in threaded engagement with the base 64 and each having interposed between the head thereof and the mounting a spring washer 68 (Fig. 70 12) whereby it will be perceived that the stylus arm 66 is capable of requisite rocking movement. The outer extremity 69 of the stylus arm 66 is enlarged and provided with the longitudinally disposed recess 70 (Fig. 75 13) adapted to receive the shank 71 of the stylus member 72, and said enlargement or head 69 is also provided with a transverse recess 73 in communication with the recess 70 and through which is disposed the set  
 80 screw 74 adapted to contact with the shank 71 and clamp the same in operative position.

The stylus member 72, as herein embodied, is in the form of an interiorly threaded socket adapted to receive the exteriorly  
 85 threaded mounting 75 in which is positioned a jewel stylus 76. In practice, I find it of advantage to provide the base of the mounting 75 and the base portion of the stylus member 72 with the openings 77  
 90 whereby it will be perceived that upon the application of the mounting 75 within the member 72, there will be no compression of air which I have found in practice will have a tendency to affect the efficiency of my  
 95 device.

While it is thought to be self-evident that the elbow 50 is capable of an adjustment axially of the arm 38, I wish to state that this arrangement is particularly advanta-  
 100 geous as it permits a regulation of the angle with which the stylus 76 engages the record upon the table 19 whereby the quality of the tone may be materially benefited in accordance with the character of the rec-  
 105 ord, it being understood that my sound reproducing machine may be employed with equal convenience with records of differing manufacturers.

As herein embodied, the marginal por-  
 110 tions of the diaphragm D are projected between the adjacent edges of the split rubber ring 78 whereby the diaphragm is effectively maintained against engagement with any of the metallic parts of the sound box. By  
 115 this arrangement, it will be seen that the diaphragm D may be properly assembled and that the tubular rubber tube 78 serves to effectively protect the diaphragm, as here-  
 120 inbefore stated, against contact with any of the metallic parts of the sound box.

From the foregoing description, it is thought to be obvious that a sound repro-  
 125 ducing machine constructed in accordance with my invention is of an extremely simple and comparatively inexpensive nature and is particularly well adapted for use by reason of the convenience and facility with which it may be assembled, and it will also be obvious that my invention is susceptible  
 130



of some change and modification without material departure from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice.

I claim:

1. A device of the character described including a cabinet provided with an opening in one of its faces, a horn within the cabinet and in communication with the opening, a tubular member secured to the cabinet and surrounding the opening therein, a sleeve rotatably supported by the tubular member, a tubular supporting arm in communication with the sleeve and capable of swinging movement independently thereof, a sound box operatively engaged with the tubular arm, and means carried by the sleeve co-acting with the arm for holding the arm against movement independently of the sleeve.

2. A device of the character described including a cabinet provided with an opening in one of its faces, a horn within the cabinet and in communication with the opening, a tubular member secured to the cabinet and surrounding the opening therein, a sleeve rotatably supported by the tubular member, a tubular supporting arm in communication with the sleeve and capable of swinging movement independently thereof, a sound box operatively engaged with the tubular arm, and a sliding member carried by the sleeve, said tubular arm being provided with a cavity to receive the sliding member when moved in one direction for holding the arm against swinging movement independently of the sleeve.

3. A device of the character described comprising a cabinet, a tubular member secured to a face thereof, a horn within the cabinet in communication with the tubular member, said tubular member being provided with an interior annular shoulder, a sleeve disposed within the tubular member and provided with an annular shoulder underlying the interior shoulder of the sleeve and provided with a head overlying the outer face of the tubular member, anti-friction means interposed between the opposed faces of the shoulders of the tubular member and the sleeve, anti-friction means interposed between the outer face of the tubular member and the adjacent face of the head, a tubular arm carried by the sleeve and in communication therewith, and a sound box carried by the arm.

4. A device of the character described comprising a cabinet, a tubular member secured to a face thereof, a horn within the cabinet in communication with the tubular member, said tubular member being provided with an interior annular shoulder, a sleeve disposed within the tubular member and provided with an annular shoulder underlying the interior shoulder of the sleeve and provided with a head overlying the outer face of the tubular member, anti-friction means interposed between the opposed faces of the shoulders of the tubular member and the sleeve, anti-friction means interposed between the outer face of the tubular member and the adjacent face of the head, a tubular arm carried by the sleeve and in communication therewith, and a sound box carried by the arm, the shoulder of the sleeve being capable of removal.

5. A device of the character described including a cabinet provided with an opening in one of its faces, a horn in communication with the opening, a barrel secured to the casing and surrounding the opening therein, a tubular member within the barrel and capable of longitudinal movement independently of the barrel and provided with a longitudinally disposed rack, a sleeve rotatably supported by the tubular member, a tubular supporting arm in communication with the sleeve, a sound box operatively engaged with the arm, and a pinion carried by the barrel in mesh with the rack of the tubular member for imparting endwise movement to the tubular member.

6. A device of the character described including a cabinet provided with an opening in one of its faces, a horn in communication with the opening, a barrel secured to the casing and surrounding the opening therein, a tubular member within the barrel and capable of longitudinal movement independently of the barrel and provided with a longitudinally disposed rack, a sleeve rotatably supported by the tubular member, a tubular supporting arm in communication with the sleeve, a sound box operatively engaged with the arm, and a pinion carried by the barrel in mesh with the rack of the tubular member for imparting endwise movement to the tubular member, said pinion projecting exteriorly of the barrel.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ANNIE W. SCHMIDT.

Witnesses:

CHARLES W. HODSON,  
NELLIE M. HODSON.

PHONOGRAPH PATENT.

PHONOGRAPH,

# 1,158,750-----G. H. Underhill,  
Patented-November 2nd, 1915.  
Filed-February 16th, 1906.



G. H. UNDERHILL.  
 PHONOGRAPH.  
 APPLICATION FILED FEB. 16, 1906.

1,158,750.

Patented Nov. 2, 1915.  
 2 SHEETS—SHEET 1.

FIG. 1.

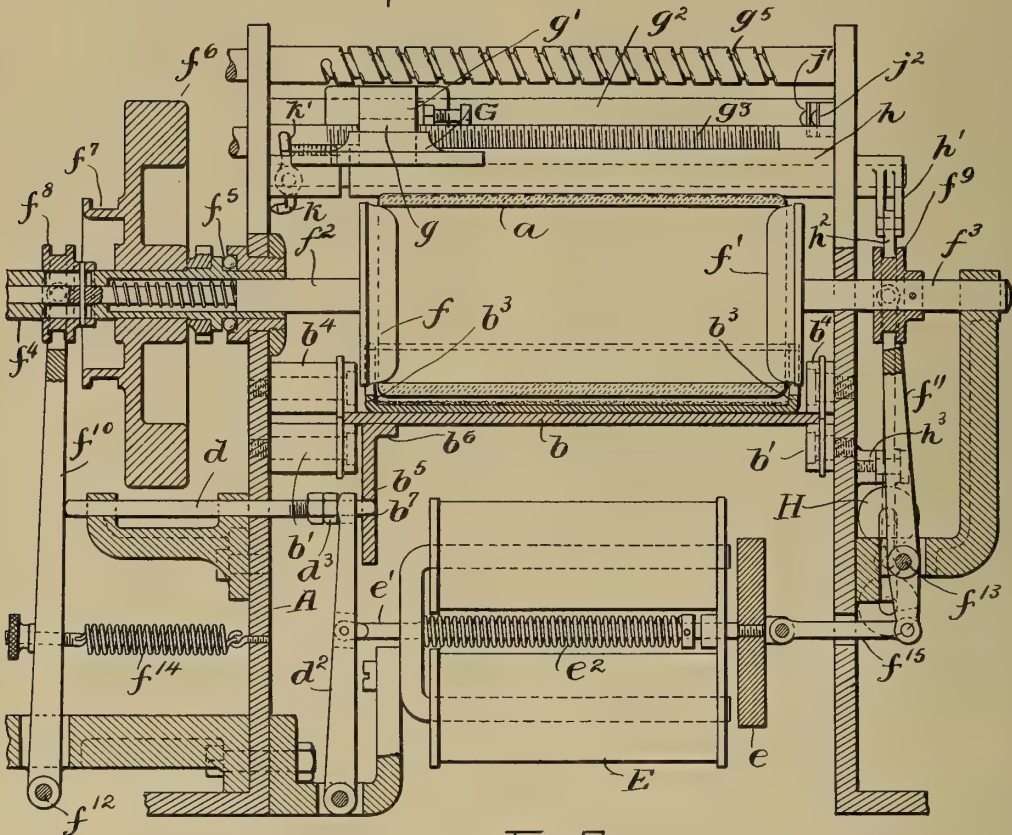
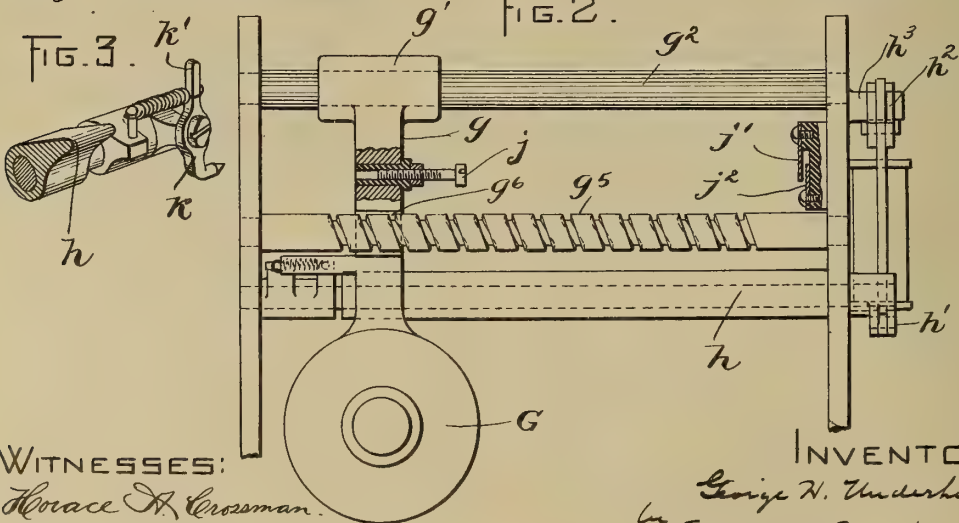


FIG. 2.



WITNESSES:

Horace A. Crossman.  
 Robert H. Hammler.

INVENTOR:

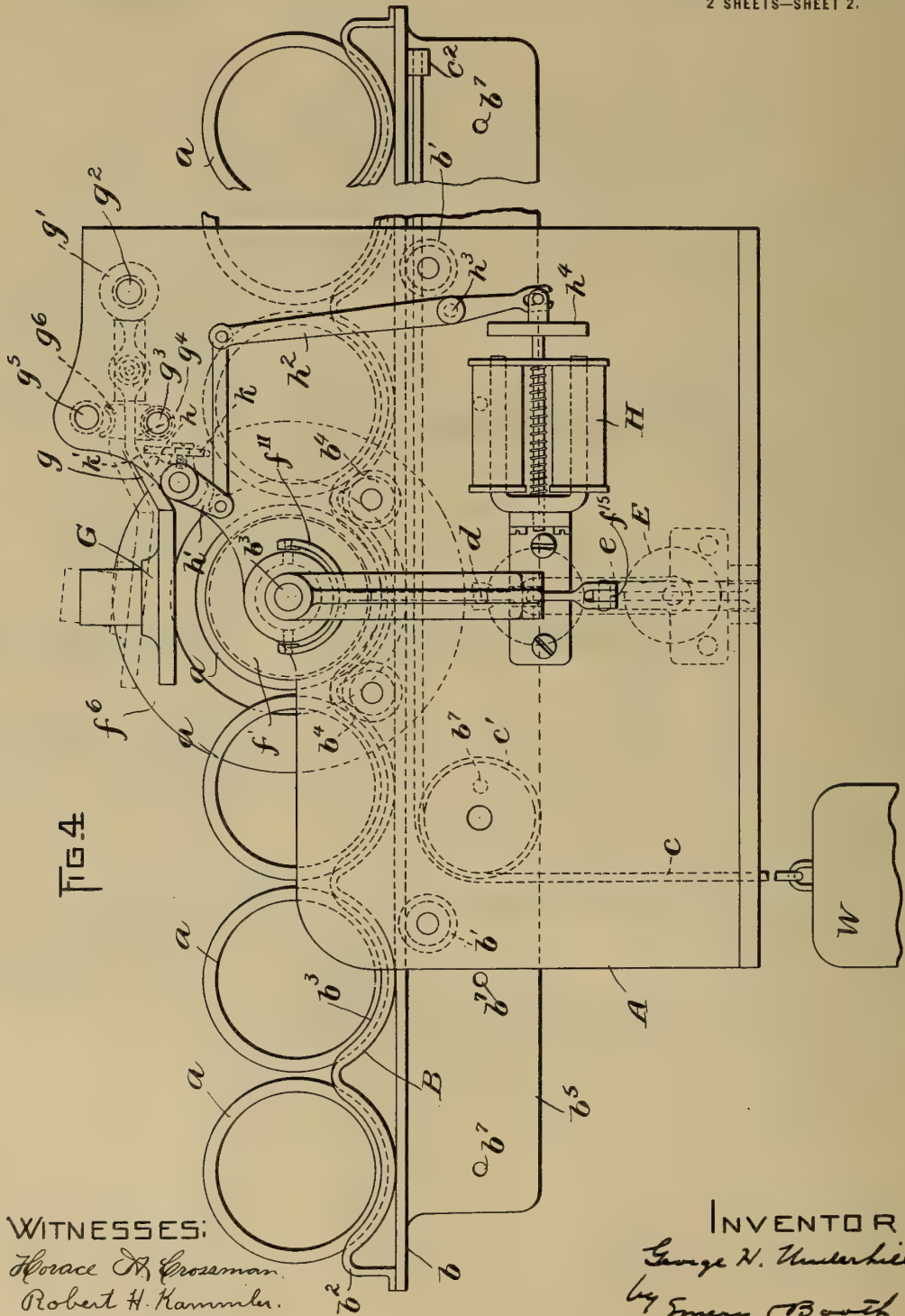
George N. Underhill  
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 Attorneys



G. H. UNDERHILL.  
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 2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

GEORGE H. UNDERHILL, OF BOSTON, MASSACHUSETTS.

## PHONOGRAPH.

1,158,750.

Specification of Letters Patent.

Patented Nov. 2, 1915.

Application filed February 16, 1906. Serial No. 301,339.

*To all whom it may concern:*

Be it known that I, GEORGE H. UNDERHILL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Phonographs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention consists in improvements in sound reproducing or sound recording machines.

Many features of my invention have useful application to various types of such machines, including those employing but a single record, but my invention is particularly applicable and is herein illustrated with reference to one type of multiple record machine employing a plurality of cylindrical records adapted automatically and successively to be brought into reproducing or recording relation with reference to suitable reproducing or recording mechanism, the latter being caused automatically to traverse the face of each record as the same is presented.

My invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment, which, it will be understood, represents but a single form thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings,—Figure 1 is a central vertical section partially broken away, showing the principal operating parts of a phonograph embodying one form of my invention; Fig. 2 is a plan showing principally the sound box traversing mechanism in the phonograph illustrated in Fig. 1; Fig. 3 is a detail of the mechanism for lowering the sound box on its return to its initial position; and Fig. 4 is a side elevation, partially broken away, of the instrument shown in Fig. 1.

In the drawings, for illustrative purposes, I have shown the various features of my invention embodied in a multiple record phonograph (Figs. 1 to 4), employing a series of record cylinders  $\alpha$  which may be of any usual or ordinary type.

The term "phonograph" I herein employ

in its generic sense to signify a machine of any type for producing or reproducing sounds, it being immaterial whether such machine is of the graphophone or gramophone type, or whether it employs cylindrical, disk or other records.

The several records are held in a holding device B, of any suitable form or construction. In the described form of my invention the holding device B is provided with a flat and rigid base  $b$ , the lateral edges of which rest upon sets of flanged roller supports  $b'$ , journaled at either side and either end of the frame A of the machine (Figs. 1 and 4), and along which the holder may be intermittently moved while guided thereby for the playing of the successive records.

The base of the holder is provided with a bottom  $b^2$  preferably formed with corrugations or otherwise, to provide suitable separate compartments for the several cylindrical record shells, which, as shown in Fig. 4, rest in the separate depressions of the corrugated bottom strip  $b^2$ . The corrugated strip  $b^2$ , may be of sheet metal or papier mâché or any other suitable material, and is preferably lined with felt, or other soft substance to prevent injury to the record surfaces. At each side of the bottom strip  $b^2$ , where the depressions or corrugations are formed, there is provided a small up-turned lip or flange  $b^3$ , which overlies the end of the record, preventing thereby material longitudinal displacement of the same, such flange, however, in this particular type of machine, for a purpose to be described, being preferably of a height insufficient to cover any portion of the open end of the record sleeve. Engaging with the upper edges of the base plate  $b$ , are guide rollers  $b^4$ , which coöperate with the rollers  $b'$ , to keep the record holders in horizontal alinement.

The record holder may be made of any desired length or capacity, or, if desired, may be made in sectional lengths and added one to another as increased capacity is wanted.

Between the playing of one record and the subsequent playing of the next, the holder is shifted one step forward upon the roller supports to bring the next record in approximate operative position and to withdraw the preceding record therefrom. For this purpose there is provided any suitable moving



mechanism, the same, herein, however, consisting simply of the weight, *W*, which is connected to the cord *c* (Fig 4), passing over the pulley *c'*, and fastened to the base of the holder at *c''*, near its rear end. This constantly acts to draw the holder forward and, by cooperating with locking and positioning devices which intermittently release the holder, the latter is fed forward at appropriate intervals through a step by step movement.

The holder is positioned by means of an underlying locking bar *b''*, attached by hangers *b''*, to the under side of the base, which bar is provided with apertures *b''*, placed at intervals corresponding to the intervals separating the successive records in the holder.

When the holder is moved to bring the record in proximity to its operative position, the aperture *b''* is entered by the end of a positioning rod *d*, which stops further movement of the holder and there retains it until the said rod is withdrawn. This rod is withdrawn after a record has been played by any suitable automatic means. As illustrative of one way of accomplishing this I have shown the electro-magnet *E*, located beneath the holder in a substantially central position. On the completion of the playing of a record, this magnet is energized through means hereinafter described, causing the attraction of its armature *e*, attached to the sliding rod *e'*, said armature being normally held away from the poles of the magnet by the compression spring *e''*. The opposite end of the sliding armature rod is jointed to the upright lever *d''*, pivoted on the machine frame so that the described movement of the armature causes this lever to engage with the collar *d''* upon the locking rod *d*, withdrawing the latter from the aperture in the locking bar *b''*, freeing the holder for advance movement.

Referring now more particularly to the means for supporting and rotating the records: the same may be constructed in various ways; having regard to the type of records employed or the shape or construction of the holder used. I have herein shown the supporting and rotary means combined in cooperating rotatable end supports, *f* and *f'*. Herein these are slidably mounted with and upon spindles *f''*, *f'''*, for longitudinal movement toward and away from the ends of the record and are bell-shaped in form, slightly rounded at the ends, and so formed that they may readily enter the open ends of the record sleeves and, while lifting the record free from its holder and alining it in its operating position by the enforced wedging action, also clasp the record at its ends, so as rotatably to hold it for cooperation with the sound box which is lowered at the appropriate time into operative relation thereto.

Rotation of the record may be effected through either or both of the end supports or through separate driving devices, if desired, but herein the end support *f* is a driven, and the support *f'* an idle or bearing member only. For this purpose the spindle *f''* of the support *f* has a sliding movement in the sleeve *f''*, but is keyed thereto to rotate therewith, the said sleeve, however, being journaled in the frame where shown and also upon an exterior arm not visible in Fig. 1, and being provided with ball thrust bearings *f'''*. To the driving sleeve is secured the fly wheel *f''*, upon which is formed the driving pulley *f''* which has connection by a belt with any suitable source of driving power, the fly wheel tending to keep constant the speed of rotation of the support *f*, while being clutched to and unclutched from successive records and tending therefore to start up the new record instantly at its normal speed.

The outer end of the driving sleeve *f''* carries the grooved collar *f'''*, which is attached to the spindle *f''* by a pin working in a slot in the sleeve, so that the collar turns with the latter but may be moved longitudinally to cause longitudinal movement of the end support. The spindle *f'''* for the opposite end support *f'* being also slidably and rotatably mounted in the frame, has the grooved collar *f'''* secured thereto, by which it may also be given sliding movement. With the grooves of the collars *f'''* and *f'''* respectively are engaged the yoke levers *f'''* and *f'''*, the former pivoted at *f'''* upon the frame, and the latter at *f'''*. The lever *f'''* is normally drawn by the adjustable tension spring *f'''*, to move the end support *f* inwardly toward the record end. When the magnet *E* is energized, however, and the end of the latch rod *d* withdrawn from the locking bar *b''*, the opposite end of the rod engages the lever *f'''*, and forces it in the opposite direction, withdrawing the end support *f*, from the open end of the record. Simultaneously the other end support *f'* is withdrawn from the opposite open end of the record by swinging movement of the pivoted lever *f'''* which, at its lower end, is attached to the armature *e* by the short link *f'''*. It will, therefore, be clear that on the energization of the magnet *E* and release of the holder for its advance movement, each end support is simultaneously withdrawn freeing the record and restoring it to the holder by permitting it to gravitate to its seat thereon. During advance of the holder, the end supports are held sufficiently retracted to clear the record ends by the action of the locking bar *b''*, the face of which slides along the end of the locking rod *d*, pressing the latter back and holding both end supports withdrawn until the next aperture is reached and the next record brought



into the desired position. At that instant the locking rod moves into the aperture of the locking bar, releasing the end supports, which are then caused to enter the open ends of the next record, and in a like manner lift it free from its support and there rotatably hold it in alinement for the coöperating action of the sound box.

The sound-box G, stylus, and other parts connected therewith, may be of any suitable or usual construction and the same are accordingly not shown and illustrated in detail.

The sound-box, however, is supported upon an arm *g*, attached to a sleeve *g'*, the latter having sliding movement upon the rod *g<sup>2</sup>*. For the forward or reproducing movement of the sound-box, there is provided the underlying fine threaded feed screw *g<sup>3</sup>*, which is adapted to engage with the nut *g<sup>4</sup>*, attached to the under side of the arm *g*. For the return movement of the sound-box, there is provided the over-lying coarse threaded feed screw *g<sup>5</sup>*, adapted to engage with the nut *g<sup>6</sup>*, upon the upper side of the arm *g*. These screws are given constant rotative movement through suitable gearing (not shown) driven from the sleeve *f<sup>4</sup>*. During the playing of the record the arm is depressed, as shown in full lines in Fig. 4, and through engagement with its nut *g<sup>4</sup>* with the screw *g<sup>3</sup>*, is fed gradually toward the end of the record. When the sound-box reaches the desired point in its travel, it is automatically lifted by movement of the cam shelf *h*, which extends the width of the machine, and is eccentrically mounted in the frame thereof. This cam shelf has the arm *h'* (Fig. 4) linked to the lever *h<sup>2</sup>*, the latter pivoted at *h<sup>3</sup>* and connected with the armature *h<sup>4</sup>* of a magnet H, which is energized to attract its armature and lift the cam shaft when the playing of the record is completed.

The lifting of the sound-box disengages the nut *g<sup>4</sup>* from the forward feed screw *g<sup>3</sup>*, and causes engagement of the nut *g<sup>6</sup>* with the coarse threaded return screw *g<sup>5</sup>*. When this takes place, the sound-box, with its attached arm thereupon, reverses its movement and travels toward its initial position, being held in its elevated position during its travel thereto by the cam shelf *h*.

The magnets H and E may be energized in any suitable way, but preferably energization is effected by a contact maker carried by the sound-box or its arm. In Fig. 2 I have shown the contact maker *j* adjustably carried by the arm *g* and adapted to engage with the movable resilient contact *j<sup>1</sup>*, to force the same against the stationary contact *j<sup>2</sup>*, to close a circuit (not shown) through which current is supplied to energize the two magnets H and E. The moment this takes place, which will be when reproduction of the record has been com-

pleted, the sound box is instantly elevated and starts on its return movement, while the record, released from its end supports, is restored to the holder and the latter advances one step to present a fresh record, which in turn is engaged by the end holders and alined in preparation for the return of the sound-box.

The cam shelf *h* is locked in its elevated position by the pin *k* carried by the spring pressed swinging arm *k'*; the pin *k* entering a corresponding depression in the machine frame. The shelf, therefore, remains in this position until the sound-box approaches its initial position, when, at the appropriate time, the arm *g* engages the upright end of the arm *k'*, and, as the sound-box advances, causes withdrawal of the pin from its depression in the machine frame. The cam shelf thereupon immediately drops to the full line position in Fig. 4, causing the engagement of the stylus with the fresh record and a repetition of its preceding movement.

In the machine described, it will be observed that the cylindrical records require no supporting mandrels, but that when played they are supported by the rotatable end supports, which act also to free them from the holder. It will also be observed that the wedging action of the end supports effects not only a lifting or freeing of the record from the holder and a driving engagement between the rotary support and the record but also an automatic centering or alining of the record with reference to its desired axis of rotation which naturally follows from the shape of the supports *f* and *f'*.

If desired, the individual records might be provided each with a usual or suitable mandrel support, and the record be freed from its holder by the engagement of the end supports with the mandrel rather than the record directly. Where such mandrels are employed, it is also within my invention to rest the individual records each in the holder by causing the mandrel instead of the record to be held loosely by the holder, the mandrel and record, however, being preferably freed therefrom when engaged by the end support or supports. When employing records with or without individual mandrels or other like supports, my invention may be applied to any suitable type of holder whether the same consists of a wholly movable magazine or one which is partly stationary and partly movable, or whether it consists of a partly or wholly flexible carrier such as a link or chain holder or holders.

So far as I am aware, I am the first to provide a phonograph having a record rest, a stylus, and means for gripping and rotating a record in operative relation to the stylus, the said means also operating to free the record from its rest, and I desire to



claim the same broadly, it being evident that the record may be of the cylindrical, disk or other form.

While I have shown and described one embodiment of my invention in detail, and have referred to its application to a particular type of machine and a particular class of records, it is to be understood that the same is not limited in its application to such a machine and such records only or to the details or relative arrangement of parts disclosed, but that wide departures therefrom may be made without deviating from the spirit of the invention.

#### 15 Claims:

1. A phonograph having record holding means for loosely holding a record and record rotating means for engaging the record and shifting it from the holder into operative position.

2. A phonograph having a record rest, a stylus, and means for gripping and rotating a record in operative relation to the stylus, the said means also operating to free the record from its rest.

3. A multiple record phonograph having record holding means wherein the record shells rest upon their faces and record rotating means for successively engaging the several records and shifting each into an operative position.

4. A multiple phonograph having record engaging means for engaging individual records and rotating the same relatively to a sound box stylus, holding means for loosely holding a plurality of records, said records resting in the holding means on their outside faces, and means for moving said holding means relatively to the engaging means to bring the records individually within the action of the latter.

5. A multiple record phonograph having a stylus means for engaging and supporting a cylindrical record while the latter is engaged by said stylus, means for loosely holding a plurality of such records, said records resting in the holding means on their outside faces, and for presenting the same while in said holding means to the action of said engaging and supporting means.

6. A multiple record phonograph having stylus mechanism, means for holding cylindrical records loosely while resting on their outside faces, and means for moving a record transverse to the axis of record rotation for presenting it to the stylus mechanism.

7. A phonograph employing a cylindrical record and having a pair of tapered end supports and means for causing them automatically to enter and engage with the opposite open ends of the record.

8. A multiple record phonograph employing cylindrical records and having record holding means, means for engaging the individual records, and shifting the same from

the record holding means each record being supported solely by said record engaging means when in operative position.

9. A multiple record phonograph employing cylindrical records having holding means for loosely holding a plurality of records, means for presenting said records in operative relation to the sound reproducing or sound recording mechanism, oppositely movable end engaging devices for engaging the ends of said records and freeing them from the holding means.

10. A multiple record phonograph having a holder for loosely holding a plurality of records and an axially movable bell-shaped record support adapted to enter the open end of the record and lift the same out of its holder.

11. A multiple phonograph having means for holding a plurality of records, means to present them successively in operative position and a common movable support for said records when in operative position adapted by its movement to receive said records for rotation and shift them from the holder.

12. A multiple record phonograph having means for holding a plurality of records and presenting them successively in operative position, and tapered end-engaging means for engaging the end of a record thus presented.

13. A multiple record phonograph having means for holding a plurality of cylindrical record shells, and record supporting and shifting means engaging directly with the walls of the record shells to place and maintain successive records in operative position.

14. A multiple record phonograph having stylus mechanism, means for loosely holding a plurality of cylindrical records said records resting upon their sides in said holding means, and means for successively presenting said records to the stylus mechanism and causing rotation thereof while supported at the end walls of the record shells.

15. A multiple record phonograph having a rotatable record support, a series of records and supporting means causing travel of the individual members of the series in sufficient proximity to said support to be engaged thereby and shifted free from the supporting means.

16. A multiple record phonograph having means for holding a plurality of cylindrical records, shifting means to bring said records to an approximate operative position, and means engaging with the walls of the record shells to shift them to an exact operative position in a direction transverse to the axes of the record shells.

17. A multiple record phonograph having means for holding a plurality of cylindrical record shells, means to move said

holder to bring said shells successively into an approximate operative position and means engaging with the walls of the record shells to lift them above the holder to an exact operative position.

18. A multiple record phonograph having record holding means in which the record shells are held loosely, means for bringing successive records into an approximate operative position, and means engaging with the walls of the record shells for freeing the same from said holding means and permitting rotation thereof without substantial change in position.

19. A phonograph having record-holding means on which the record shell rests loosely upon its outer face, and record-rotating means for engaging and shifting the record.

20. A multiple phonograph having a box-like holder, a plurality of records loosely

held therein, and means for engaging the record and freeing it from the holder without substantial longitudinal displacement.

21. A multiple record phonograph having record-holding means, and means engaging the walls of the record for freeing the same from the holder without substantial longitudinal displacement relatively to the holder.

22. A multiple record phonograph having record-holding means, and means to engage a record and lift it slightly above the holder to free the same from the holder without substantial lateral displacement therefrom.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE H. UNDERHILL.

Witnesses:

THOMAS B. BOOTH,  
EDITH E. CHAPMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





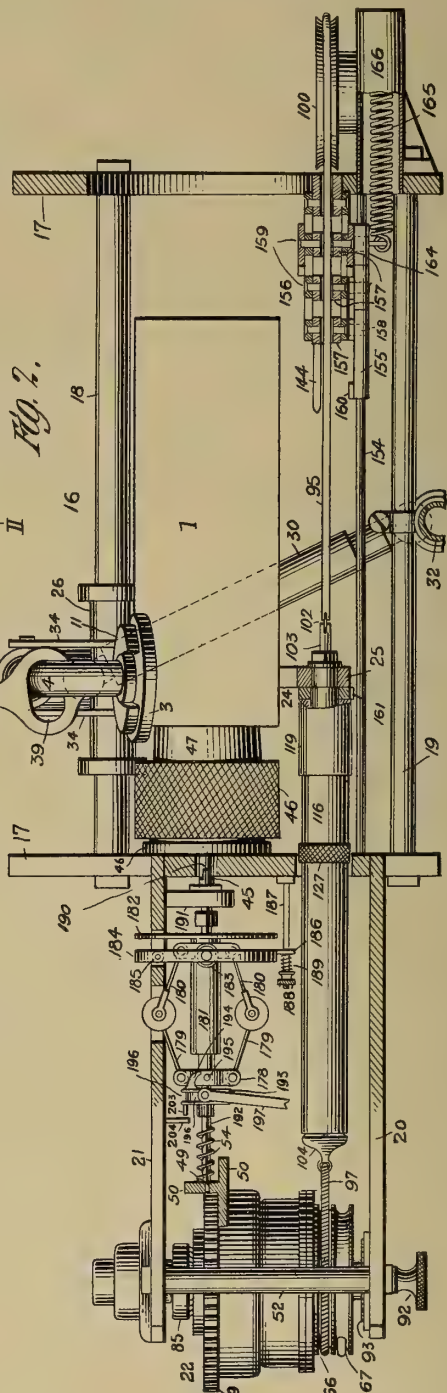
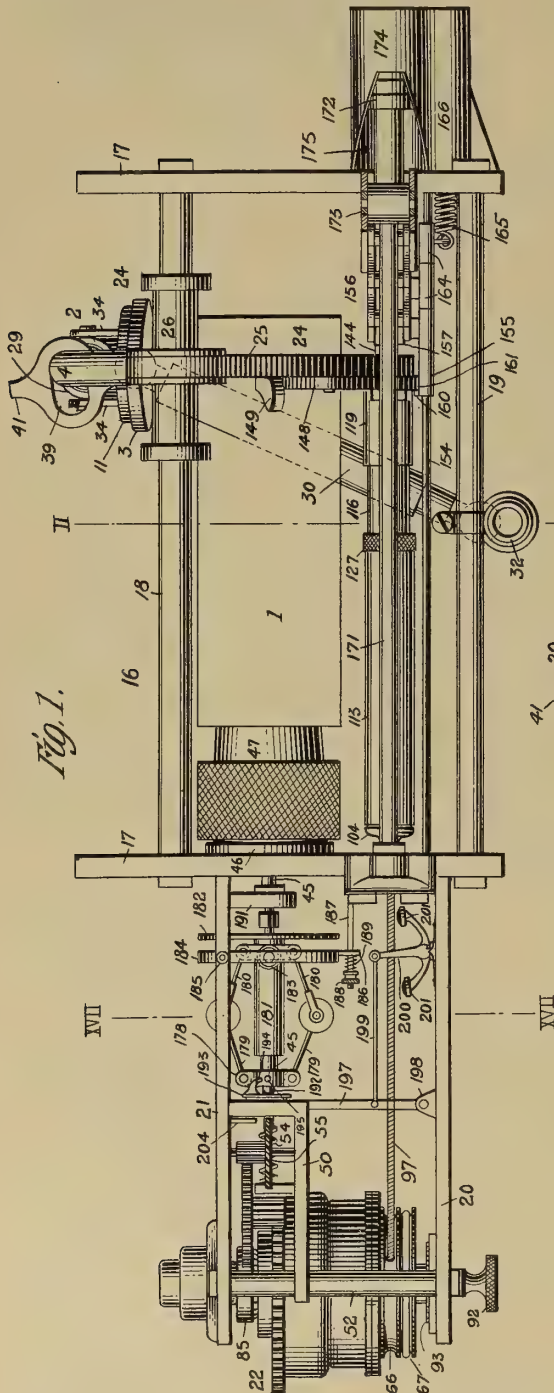
MACHINE FOR RECORDING AND REPRODUCING  
SOUND,

# 1,158,917-----J. H. J. Haines,  
Patented-November 2nd, 1915.  
Filed-June 25, 1909.

J. H. J. HAINES.  
MACHINE FOR RECORDING AND REPRODUCING SOUND.  
APPLICATION FILED JUNE 25, 1909.

1,158,917.

Patented Nov. 2, 1915.  
6 SHEETS—SHEET 1.



Witnesses:  
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J. H. J. HAINES.  
MACHINE FOR RECORDING AND REPRODUCING SOUND.  
APPLICATION FILED JUNE 25, 1909.

1,158,917.

Patented Nov. 2, 1915.  
6 SHEETS—SHEET 2.

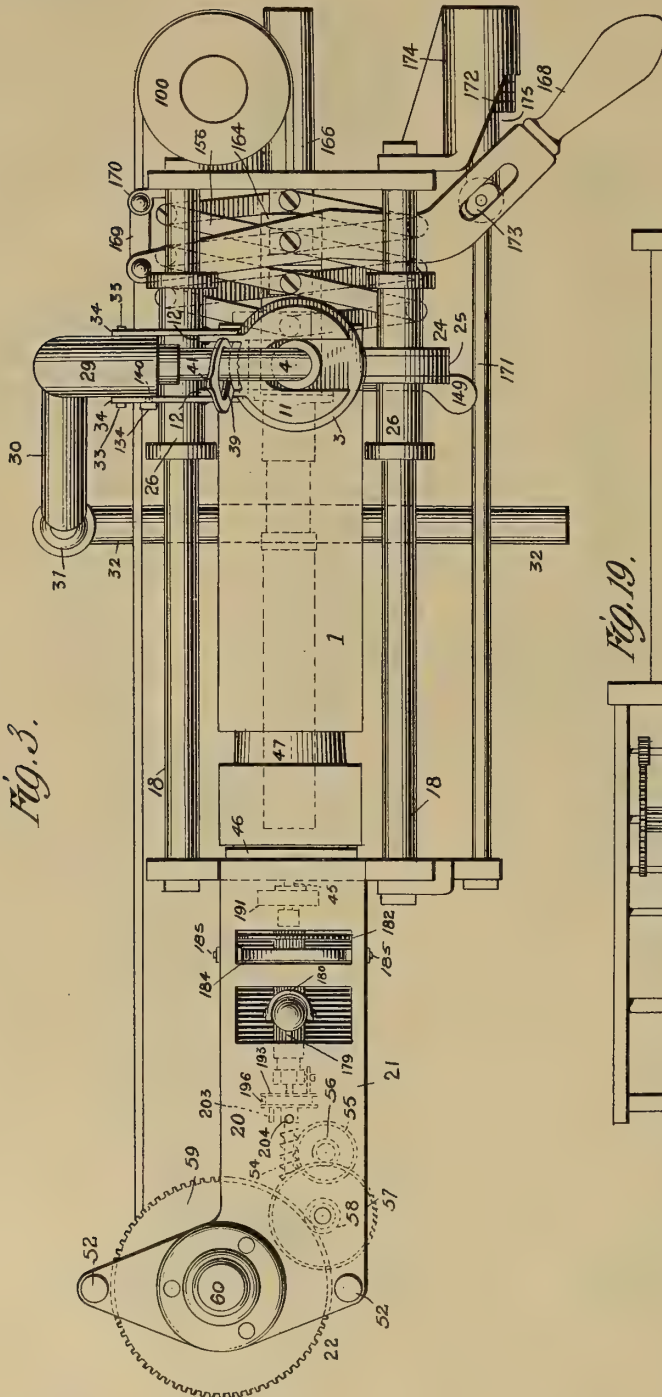


Fig. 3.

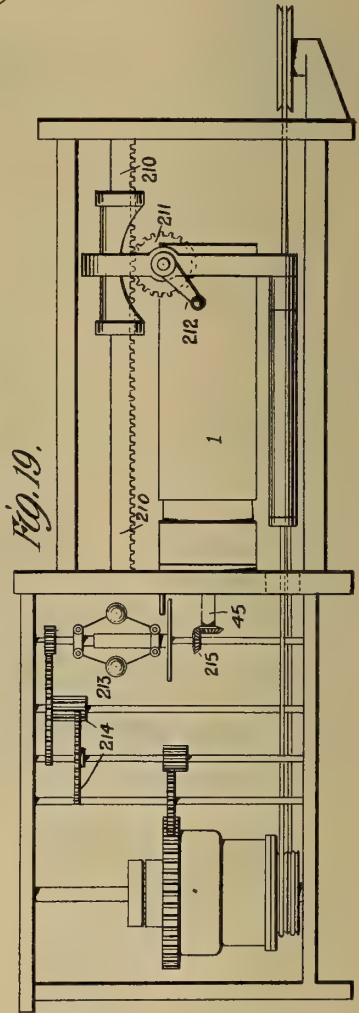


Fig. 19.

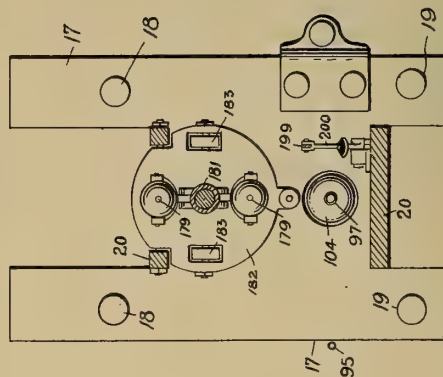
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*John H. J. Haines*  
By his Attorneys  
*Rosenbaum & Stockbridge*



APPLICATION FILED JUNE 25, 1909.

6 SHEETS--SHEET 3.



John H. J. Haines Inventor  
By his Attorneys  
Rosenbaum & Stockmeyer





J. H. J. HAINES.

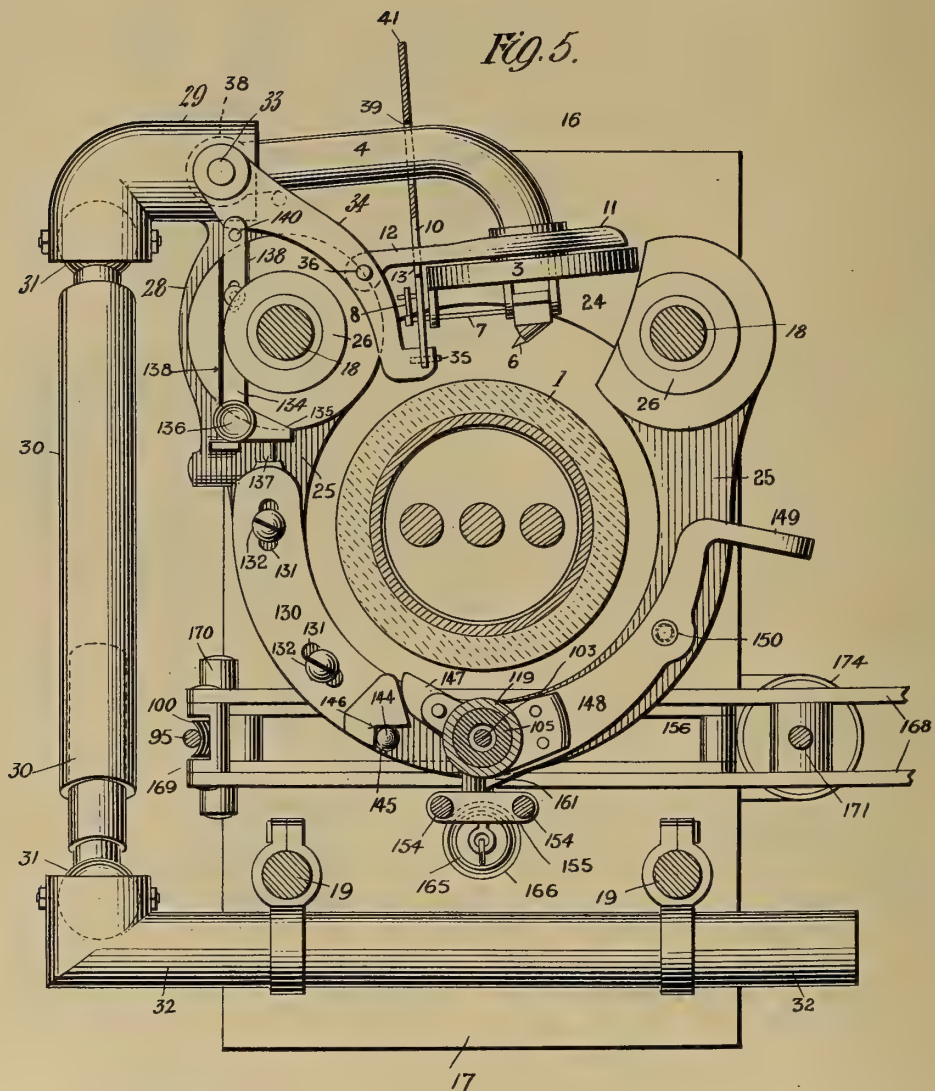
MACHINE FOR RECORDING AND REPRODUCING SOUND.

APPLICATION FILED JUNE 25, 1909.

1,158,917.

Patented Nov. 2, 1915.

6 SHEETS—SHEET 4.



Witnesses:

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*Arthur*

Inventor

*John H. J. Haines*  
*By his Attorneys*  
*Rosenbaum & Stockbridge*

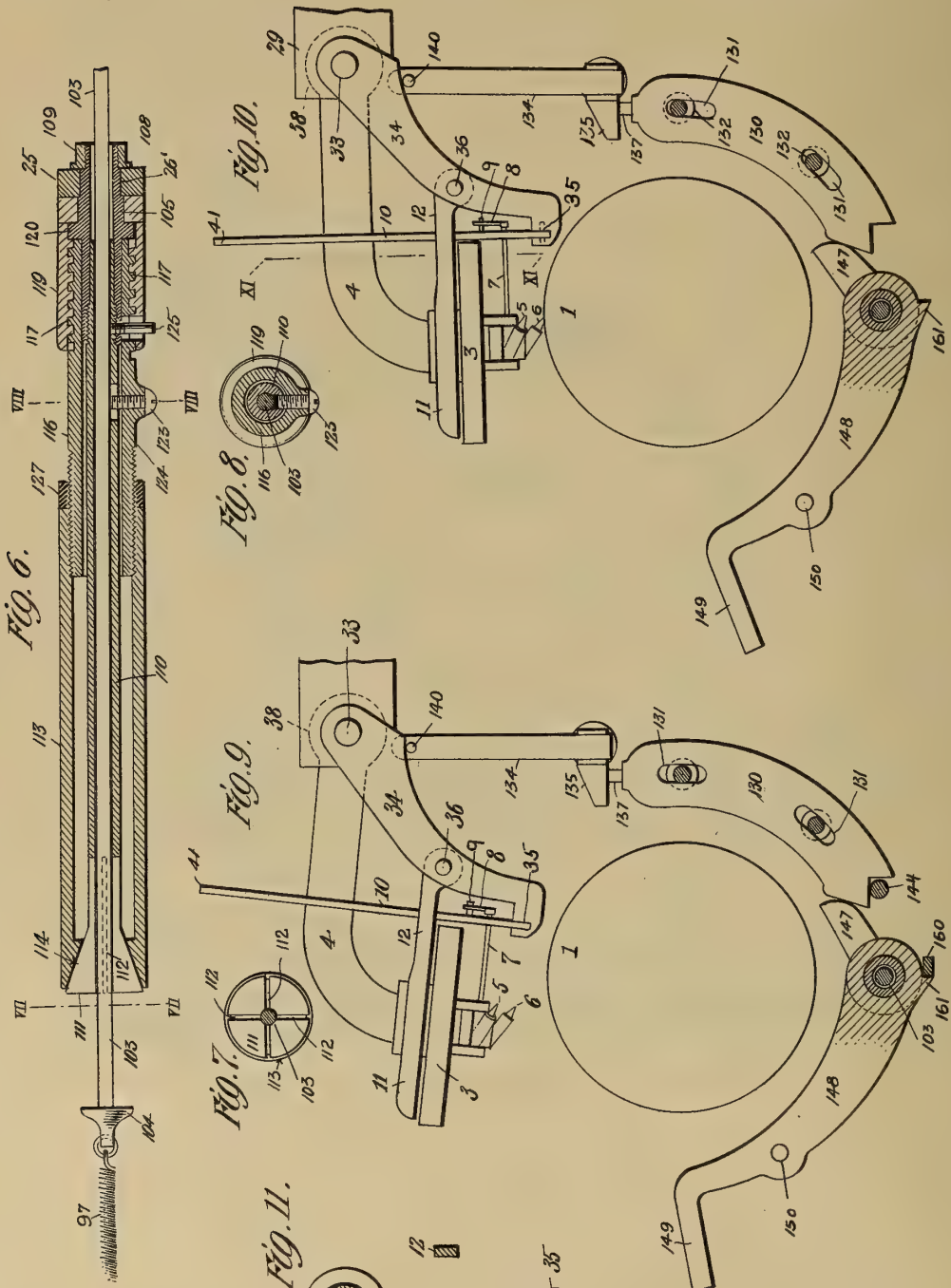




J. H. J. HAINES.  
MACHINE FOR RECORDING AND REPRODUCING SOUND.  
APPLICATION FILED JUNE 25, 1909.

1,158,917.

Patented Nov. 2, 1915.  
6 SHEETS—SHEET 5.



Witnesses:  
Francis Ober  
Andrew Stein

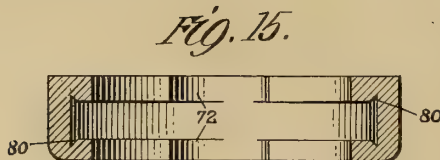
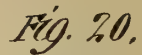
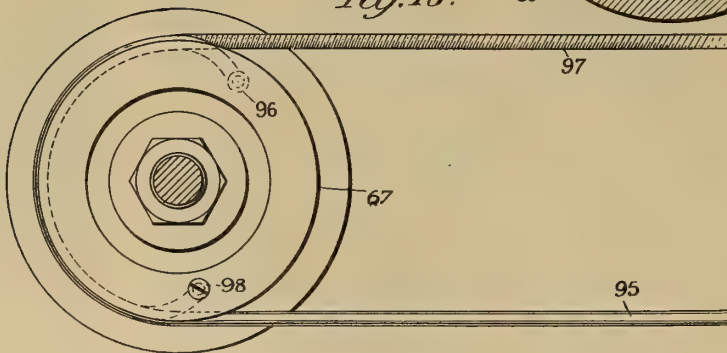
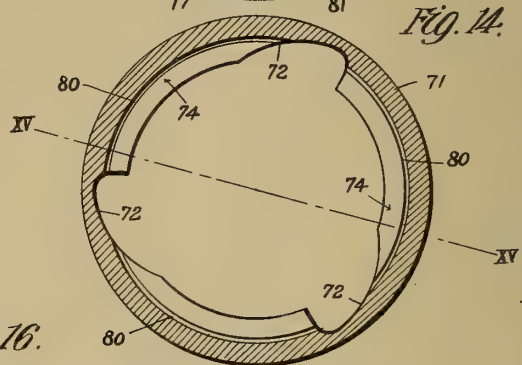
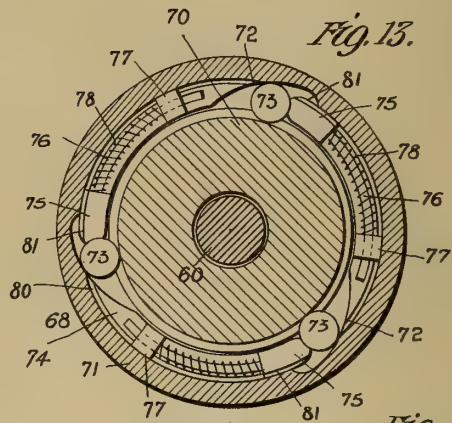
Inventor  
John H. J. Haines  
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Rosenbaum & Stockbridge



MACHINE FOR RECORDING AND REPRODUCING SOUND.

Patented Nov. 2, 1915.

6 SHEETS—SHEET 6.



Frank. Ober  
Antonia St.

Inventor  
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By his Attorneys  
Rosenbaum & Stockbridge



# UNITED STATES PATENT OFFICE.

JOHN H. J. HAINES, OF NEW YORK, N. Y.

MACHINE FOR RECORDING AND REPRODUCING SOUND.

1,158,917.

Specification of Letters Patent. Patented Nov. 2, 1915.

Application filed June 25, 1909. Serial No. 504,247.

*To all whom it may concern:*

Be it known that I, JOHN H. J. HAINES, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Machines for Recording and Reproducing Sound, of which the following is a full, clear, and exact description.

10 This invention relates to sound reproducing apparatus of any sort where a record medium is continuously rotated, and a sound recording or reproducing device is displaced gradually over the surface of the record medium. A spring or other motor has been ordinarily employed for rotating the record medium, and displacing the sound recording or reproducing device.

20 The essence of the present invention consists in utilizing, for the purpose of storing all the necessary power in the driving spring or motor, the return movements which are necessarily imparted from time to time to the sound recording or reproducing device in repositioning the latter at the commencement of the record.

From another aspect the present invention consists in a mechanism having a spring motor driving one part having a comparatively rapid rotation and another part having a very slow rectilinear displacement, and restoring the power of the spring whenever required by the mere act of returning the rectilinearly displaced part to its initial position.

30 A second feature of the invention relates to what I term a "releasable grip connection" between a sound recording or reproducing device and the means whereby the movements of such device re-tension the driving motor. The purpose of this "slip connection" is to permit a free movement of the sound recording and reproducing device independently of and without disturbing the driving motor after the latter has been tensioned.

40 A still further feature or object of the invention is to provide for the foregoing actuations without in any case injuring the record medium by improper relative movements of the sound recording and reproducing device thereon. For this purpose I provide for lifting the sound recording or re-

producing device away from the record medium an instant before the same is moved 55 under any circumstances, except in the particular case of its normal gradual movement caused by the operation of the machine in recording or reproducing sound. As will later appear, I also provide a particularly advantageous form of spring motor and a particularly efficient clutch which secures the slip connection above referred to.

Among still further features of the invention are the mechanism which I have 65 shown for returning the sound recording or reproducing device and means for establishing a flexible sound connection therefrom to a stationary sound tube. I also provide a novel form of governor, and a stop motion 70 associated therewith.

With these various and other objects in view my invention consists in the features of construction and combination as hereinafter set forth and claimed.

75 In the drawings: Figure 1 is a front elevation of a sound reproducing apparatus embodying the principles of my invention. Fig. 2 is a similar view showing the sound recording or reproducing device at the commencement of a record. Fig. 3 is a top or plan view of the same with the parts in the relation shown in Fig. 1. Fig. 4 is a horizontal sectional view. Fig. 5 is a vertical sectional view on the line II—II of Fig. 1, 80 looking in the direction of the arrow. Fig. 6 is a sectional view of the clutch which constitutes what I have referred to as a "slip connection." Fig. 7 is a sectional view on the line VII—VII of Fig. 6 looking in the 90 direction of the arrow; and Fig. 8 is a section on the line VIII—VIII of Fig. 6. Fig. 9 is a partly diagrammatic sectional view showing the sound recording or reproducing device raised away from the record medium. 95 Fig. 10 is a similar view showing the sound recording or reproducing device in place upon the record medium. Fig. 11 is a sectional view on the line XI—XI of Fig. 10. Fig. 12 is a vertical sectional view of the 100 spring motor. Fig. 13 is a section on the line XIII—XIII of Fig. 12. Fig. 14 is a similar view with some of the parts removed. Fig. 15 is a section on the line XV—XV of Fig. 14. Fig. 16 is a section 105 on the line XVI—XVI of Fig. 12 looking in



the direction of the arrow. Fig. 17 is a section on the line XVII--XVII of Fig. 1 looking in the direction of the arrow. Fig. 18 is a detail view of part of the driving train including the stop motion therefor. Fig. 19 is a side elevation showing certain modifications. Fig. 20 shows a detail of the spring motor.

Referring to the drawings in which like parts are designated by the same reference sign, 1 denotes a record medium adapted to be continuously rotated, and 2 indicates a recording or reproducing device adapted to have a slow rectilinear displacement over the surface of the record medium 1. In the drawings I have shown an ordinary cylindrical phonographic record 1 and a sound recording and reproducing device 2 of the type which has been made the subject of my pending application No. 462,783. This recording and reproducing device comprises a sound chamber 3 (see Figs. 9 and 10) having a sound tube 4 and a diaphragm which may be operatively connected to either of two stylus points 5, 6, by the simple expedient of oscillating a small crank shaft 7. This crank shaft has a crank arm 8 engaging a pin 9 of a lever 10. 11 denotes a weight which has arms 12 straddling the lever 10 (see Fig. 11) and adapted to be lifted at one position of movement of said lever by the engagement of a shoulder 13 forming part of said lever. These features as thus far described, do not constitute a part of the present invention except in their broadly stated functions of constituting a sound recording or reproducing device.

In accordance with the present invention I provide a main supporting frame 16 of the machine as a whole, and comprising a pair of flat frame plates 17 rigidly joined together by upper and lower pairs of horizontal rods 18 and 19.

20, 21 denote extensions of one of the frame plates 17, which constitute a supplemental frame for the driving motor, broadly denoted 22, and its associated parts. I have shown a spring motor 22, but any arrangement by which power is stored up and subsequently released to rotate the record medium may be employed, or the weight of the carriage itself may be used, assuming that the machine is held in an inclined or vertical position.

24 designates broadly what may be termed a carriage for the sound recording or reproducing device 2, and which is guided on the horizontal frame rods 18. I make this carriage of a generally U-shaped rigid metal part 25 with rigid sleeves 26 surrounding the rods 18 for a sufficient distance of their length to get an adequate bearing surface. In practice I line the sleeves 26 with ball bearing race-ways of any suitable description and which it is not necessary to illus-

trate. One of the sleeves 26 has a rigid central upwardly projecting web 28 on which is fixed an L-pipe connection 29.

30 denotes a telescoping pair of tubes with ball shaped ends 31, respectively entering the L-pipe connection 29, and a stationary pipe 32 through which the sound is delivered or received.

The pipe connection 29 has trunnions 33 from which the sound recording or reproducing device is hung (see Figs. 9 and 10). For this purpose I prefer to make use of a U-shaped frame or bail 34 pivoted to the trunnions 33, and which may be considered as the supporting frame for all the parts of the sound recording or reproducing device. Under these circumstances the lever 10 already described is pivoted at 35 to the lower end of the bail 34, and the weight 11 is pivoted between the arms of the bail at 36. The sound tube 4 has a globular terminal end 38 within the pipe 29 on an axis concentric with the trunnions 33, and between inwardly projecting portions of which said terminal end 38 is pivoted. With this construction the lever 10 is preferably made with an elongated orifice 39 which incloses the sound tube 4, thereby supporting said tube under certain conditions and limiting the to and fro movement of said lever 10.

41 denotes an upwardly projecting portion of the lever which is shaped to facilitate its convenient manual manipulation.

From the construction as thus far described, it will be clear that the carriage 24 is adapted to slide along the frame rods 18 of the machine, whereby the sound recording or reproducing device 2 is carried along the length of the cylindrical record medium 1. Whenever desired, the sound recording or reproducing device can be lifted away from the record medium 1 by tilting upward the bail 34. Aside from this, the sound recording or reproducing device shown is adapted to be put into condition for its respective functions by merely shifting the handle 41 from one limiting position to the other. This movement oscillates the crank 8 thereby properly positioning the appropriate stylus 5 or 6 with respect to the record medium and to the diaphragm. At the same time the weight 11 is relieved from or applied to the sound box 3 on which it rests, thereby altering the pressure of the stylus on the record medium to this extent.

I will now describe the manner in which I support the record medium and give the latter its rotative movement.

45 denotes a spindle having a bearing in the head 46 forming part of one of the frame plates 17. This bearing 46 should be of ball bearing character adapted to secure as great accuracy of rotative movement as possible with minimum friction. The spindle has a usual cone 47 on which the record



medium 1 is slipped and held by the frictional engagement. At its other end the spindle is extended to a pivot bearing 49 in a bracket 50 of the frame plate 21. In order to give sufficient rigidity to this bracket 50, and further strengthen the support of the frame plates 20 and 21, I provide rigid connecting posts 52 joining the frame plates 20, 21, and to one of which the bracket 50 is also attached.

Adjacent to the bracket 50 the spindle 45 has a worm 54 with which meshes a worm gear 55 driven through a multiplying gear train 56, 57, 58, from a large gear wheel 59 which rotates concentrically on an arbor 60 which normally rigidly joins the frame plates 20, 21 at their outer extremities. (See particularly Fig. 12).

The gear 59 forms part of the spring motor 22 previously referred to. This spring motor is of a special character as mentioned in the preliminary part of the specification adapted to be removed or retensioned by the manually actuated movements of the carriage 24. As particularly shown in Fig. 12, my preferred construction of motor includes a main spring 64 fixed at the center to the arbor 60 and at its outer extremity to a drum 65. The drum 65 carries a pair of grooved pulleys 66, 67, and has a clutch connection, broadly denoted 68, with the gear wheel 59. The clutch connection 68 between the drum 65 and the gear wheel 59 is adapted to serve the general purpose of the ratchet clutch which is commonly used in spring motors to permit the rewinding of the main spring without disturbing the driving gear train of the mechanism. In the present instance however I provide a roller clutch of special construction adapted to give great sensitiveness and efficiency of action. Briefly described, the clutch comprises a central hub 70 forming part of the drum 65 and an outer sleeve 71 forming part of the gear 59. The sleeve 71 has interior inclined recesses 72 within which are received rollers 73 adapted to bear against the inclined walls of the recesses 72 and against the periphery of the hub 70.

The sleeve 71 has a comparatively deep interior groove 74 which intersects or passes through the recesses 72, and in this groove 74 I provide spring pressed followers 75 which maintain a constant engagement with the rollers 73, tending to press the latter toward the narrow end of their inclined recesses 72. Each follower block 75 has a curved stem 76 passing through an anchorage or abutment block 77 fixed in the groove 74.

78 denotes spiral springs surrounding the stems 76 by which the follower blocks are kept pressed toward the rollers 73.

In order to properly guide the follower blocks 75 in their grooves 74 I make the lat-

ter with undercut V-recesses 80 at their sides and provide the follower blocks with corresponding dovetailed enlargements 81 at their bases which fit the undercut recesses 80.

Each of the rolls 73 is preferably made in three sections 73<sup>a</sup>, 73<sup>b</sup> and 73<sup>c</sup> (see Fig. 20) independently rotatable on the same axis and together forming a cylindrical outline as shown. Under these circumstances the middle zone or section 73<sup>b</sup> lies opposite the groove 74 and is engaged by the follower block 75. The outer sections 73<sup>a</sup> and 73<sup>c</sup> of the rollers 73 engage the inclined walls of the recesses 72 and are free to turn or roll thereon without hindrance from the engagement of the follower block 75, which as stated, bears only on the middle section.

By virtue of the foregoing construction a very sensitive and efficient clutch is provided between the drum 65 and gear wheel 59.

In order to journal the parts with the necessary antifriction qualities and provide for an easy adjustment, I make both the drum 65 and the gear wheel 59 loose on the arbor 60 and supported exclusively by ball bearings.

85, 85 denote ball bearing race-ways threaded on the arbor 60 and locked in any position of adjustment thereon by the lock nuts 87. The drum 65 and the gear wheel 59 are grooved to form companion race-ways, thereby providing for the ball bearings, respectively denoted 88 and 89. 90 denotes a similar ball bearing connection between the gear wheel 59 and the hub 70 of the drum 65. It is evident that all these ball bearings are simultaneously adjusted by angularly displacing either of the race-ways 85 or 86 on the arbor 60. At the same time a perfect antifriction rotative support is established for both the drum 65 and the gear wheel 59. The arbor 60 has been described as normally fixed or stationary, but this arbor may be turned to any initial setting by a handle 92 and locked there by a ratchet wheel 93 and pawl (not shown). This setting fixes the initial tension of the main spring 64.

From the drum 65 I provide a flexible band, strap, cord, chain or connection which is extended around the groove 67 for about half a circumference and anchored at the point 96. 97 denotes another connection and for which I employ a simple spiral spring and which is passed around the other groove 66 and anchored at the point 98. The flexible connection 95 which I will briefly refer to hereafter as a cord, is extended along the entire length of the machine, passing over a loose pulley 100 at the opposite end thereof, and being returned parallel to the main portion of its length and in as close alinement with the spring 97 as possible. At the point 102 the cord 95 is joined to a rod or stem 103 having a but-



ton 104 to which is fixed the spring 97. Surrounding this rod or stem 103 is a tube 105 which moves with and is virtually a part of the carriage 24. There is a clutch connection between the tube 105 and the rod 103 and which I have previously referred to as a releasable grip connection. The function of this mechanism may be broadly defined as permitting a free movement of the carriage 24 under certain circumstances without interfering with the spring motor 22.

The carriage 24 has its U-shaped body 25 perforated at 26' (see Fig. 6) and in this hole or perforation the tube 105 is rigidly fixed by means of a nut 109.

110 denotes an extension of the tube 105 and which has a flaring or conical end 111 with radial slots 112.

113 denotes a sleeve having a taper hole 114 at its outer end corresponding in angle to that of the cone 111 and thereby constituting in effect a collet chuck to grasp the rod 103 under certain circumstances.

116 denotes an extension of the sleeve 113. This latter sleeve 116 has coarse spiral threads 117 adjacent to its inner end which adjoins the carriage 24.

119 denotes an internally threaded collar which I shall term a grip-nut threaded to the sleeve 116 and adapted to displace said sleeve longitudinally when said grip-nut is angularly turned. The grip-nut 119 has a thrust bearing connection with the tube 105 so as to be constrained against any longitudinal movement independently of said tube 105. For this purpose said tube 105 has a flange 120 and the grip-nut 119 has a reduced portion fitting between this flange and the carriage frame 25. The sleeves 113 and 116 are constrained against relative angular movement with respect to the tube 110 by means of a screw 123 passed through one of said sleeves and through a slot 112 of the tube 110.

125 denotes a screw for fixing the adjustment of tubes 105 and 110 with respect to one another, these tubes being threaded together to permit an initial adjustment. This screw 125 projects through a large opening in the surrounding sleeve 116 and also in the outside grip-nut 119 in order not to interfere with the movement of these parts. The sleeves 113 and 116 are also threaded together to permit initial adjustment, and may be locked in any desired relation by a lock nut 127.

By virtue of the foregoing construction the jaws formed by the slotted cone 111 grasp the rod 103 when the grip-nut 119 is turned so as to impel the sleeve 113 longitudinally to the left with respect to its containing tube 110. In the normal condition of the apparatus the rod 103 is tightly grasped in this manner and this connection

is only loosened under certain circumstances when the carriage is being slid back and forth freely with the sound recording or reproducing device removed from the record surface, as and for purposes later described.

I provide automatic means for elevating the sound recording or reproducing device away from the record surface whenever the carriage is moved except in the case of its normal use for sound recording or reproducing. 130 is a slider of arcuate outline having slots 131 in the general direction of the curvature of the part 130 and which also corresponds to the curvature of the lower depending portion 25 of the carriage. 132 denote screws which are passed loosely through the slots 131 and are fixed in the material of the carriage frame 25 thereby serving as guides for the slider 130, permitting the latter to have a limited arcuate movement. This movement is generally concentric with the axis of rotation of the record medium 1. 134 is a link to the lower end of which is adjustably fixed a block 135 the position of which can be altered by manipulating a set screw 136. 137 is a pin on this block and which abuts against the upper end of the slider 130. The link 134 is guided in a recess 138 of one of the sleeves 26 of the carriage and has at its upper end a pin 140 abutting against the underside of the bail 34 of the sound recording or reproducing device. It will be seen that when the slider 130 moves upwardly that the movement is transmitted to the link 134 and the bail 34, thereby elevating the sound recording or reproducing device. At its lower end the slider 130 is adapted to be engaged by two separate means for causing the foregoing movement. One of these means comprises a pin 144 which has a tapering or conical end and which passes through an opening 145 in the carriage frame 25 and engages behind the lower end of the slider 130, the latter having a V-recess 146 at this point to facilitate the engagement. The lower end of the slider 130 is also adapted to be engaged by a toe 147 rigidly attached to and forming part of the grip-nut 119 (previously described). This same grip-nut has a lever arm extension or handle 148 terminating in a bent-over extremity 149 adapted to be conveniently manipulated by hand. 150 denotes a detent which holds the lever 148 in either of its extreme positions, corresponding respectively to the gripped or loosened relation of the collet 111. It may be noted that when the handle 149 is elevated in Fig. 5, the collet 111 is loosened and at the same time the sound recording or reproducing device 2 is elevated off of the record medium. Conversely the depression of handle 149 tightens the collet 111 and permits the lowering of the sound recording



or reproducing device upon the record medium, unless said device is still held up by the taper pin 144.

I have referred to the taper pin 144 which is adapted to be passed through an opening 145 in the carriage frame under certain circumstances. This pin forms part of a mechanism for returning the carriage to its initial or starting position, or to any other position on the record medium. I provide a mechanism adapted to be projected against the carriage, and then withdrawn, so as not to interfere with the subsequent free movement of the carriage. 154 denote rods extending along the length of the machine parallel with one another and with the main frame rods 18 and 19, these rods extending centrally beneath the path of movement of the carriage as shown in Fig. 5. 155 is a block slidable on the rods 154 and to which is connected one end of a lazy-tong system 156. The latter also has smaller blocks 157 at the various central pivot joints between the links, these latter blocks being perforated along the path of the cord 95 previously described and through which said cord passes. The outer of the perforated blocks 157 may be considered as part of the block 155, the two moving together and being preferably fixedly joined together by the connecting pivot pin 158. 160 is a cam or dog on the block 155 and which engages behind a ledge 161 of the lever 148 when the block 155 is fully projected against the carriage 24. The result of this action is to lift the lever 148, thereby releasing the collet 111 in the manner already described. But the taper pin 144 is fixed to the outer block 157 and inasmuch as the latter is rigidly fixed to the block 155, the taper pin 144 has been necessarily first projected through the hole 145 of the carriage against the slider 130, thereby lifting the sound recording or reproducing device away from the record. Conversely when the carriage return mechanism is withdrawn, the taper pin 144 leaves its engagement later than the cam 160, thereby insuring the gripping of the collet before the sound recording or reproducing device is dropped again on the record. In order to steady the movement of the lazy-tongs 166, I provide additional blocks 164 at the location of the other pivot joints 159, the latter blocks being also guided on the rods 154. The inner block 164 has a tensile spring 165 secured thereto which is secured at its other end in a tube 166 at the end of the machine. This keeps the lazy-tongs normally retracted, in the position shown in Figs. 1 and 2. 168 denotes an operating handle or lever having a link connection 169 with the frame of the machine 170. This lever is pivoted to the lazy-tongs at the location of the

inner pivot pin 159, whereby the lazy-tongs are projected and retracted under the swinging movements of the lever handle. 171 denotes a stationary rod on which is sleeved a plunger 172 having a pin and slot connection 173 with the operating lever 168. 174 denotes a dash-pot or cylinder partly cut-away on one side 175 into which the plunger 172 is projected at one limit of movement of the operating lever 168. This evidently cushions the retraction of the carriage return mechanism after the latter has been projected to move the sound recording or reproducing device on the record medium.

From the foregoing it will be understood that swinging the handle 168 to the left in Fig. 4, first lifts the recording or reproducing device off the record medium and then loosens the collet clutch 111. The carriage 24 with its sound recording or reproducing device is then moved toward its initial or starting position to any point desired. If the spring motor 22 is not fully wound at this time, and the return of the carriage is continued far enough, it will happen sooner or later that the collet 111 engages the button 104, and thereafter the movement of the carriage effects a rewinding of the spring motor. This is done on account of the pull which is imparted to the cord 95. This cord, being carried around the pulley 67, causes a displacement of the drum 65 in a direction to tension the spring 64. At this time the ball clutch 68 between the drum 65 and the gear wheel 69 obviously slips. As long as the collet 111 is out of contact with the button 104, this rewinding does not occur, but the carriage merely slides idly back and forth without effect on the spring motor. It will therefore be evident that the carriage can be placed at any point desired at any time and under any circumstances whatever, and it will not be placed in any case in any position where the motor has not been sufficiently wound or tensioned to operate the mechanism to the completion of the entire record, if this is desired.

The remaining features of the invention are more or less incidental and relate to the governor, the stop motion therefor and certain other minor matters. The governor which I employ includes a collar 178 loose on the spindle 45 but constrained against longitudinal movement, and having the usual pivoted weighted arms 179, with link connections 180 to a sliding sleeve 181.

182 denotes a disk forming part of the sliding sleeve 181 and which is adapted to be displaced into contact with rollers 183 of a non-rotatable frame 184, which may be considered as stationary with respect to the disk 182. A rotation of the spindle and



collar 178 at more than a predetermined speed causes the weighted arms 179 to fly outward thereby drawing the sleeve 181 to the left and pressing the disk 182 into engagement with the rollers 183. For purposes of adjustment I make the frame 184 pivoted at 185 to the frame plate 21 and at its lower end provide an eye 186 which loosely surrounds a fixed stud 187.

188 is a thumb nut on the stud 187 for pressing a spring 189 against the eye 186. It is evident that the location of the rollers 183 is varied in this way and at the same time these rollers have a yielding action in the engagement of the disk 182.

I have referred to the spindle 45 as though the latter were continuous and unitary throughout its length, and this construction may be employed in some cases, but I prefer to make the outer extremity 192 flexibly clutched at 190 in its engagement with the main body of the spindle 45, in order to avoid binding in the bearings 50 and 191 and to provide a certain rotative back-lash between the parts to assist in starting the mechanism. The governor is also started by a lost motion connection from the spring motor. For this purpose the outer portion 192 of the spindle has splined thereto a flange or collar 193.

194 denotes a pin or hook projecting laterally from the flange 193 and adapted to impinge against a pin 195 on the collar 178 in the normal driving action of the machine. There is a normal looseness or back-lash in this engagement amounting to nearly a quarter of a turn relative movement between the parts. The purpose of the arrangement is to permit the use of a very delicate operating motor. It is evident that if the motor can start up even for a fraction of a turn without any imposed load, that its momentum thereupon becomes sufficient to give the comparatively heavy governor a sudden snap, jerk or kick which insures a prompt and reliable start.

I make use of the flange 193 as a stop motion, and for this purpose I provide a circumferential groove 196. 197 denotes a lever projecting into said groove and pivoted to the frame part 20 at 198, and having a link connection 199 with a rock arm 200 adapted to be forced from one extreme position to the other by a pair of buttons 201. 203 denotes a pin on the flange 193 which is adapted to be projected into the path of a stationary post 204 on the frame of the machine. With this arrangement it will be clear that when the left-hand operating button 201 is depressed, that the splined flange 193 will be slid to the left and its pin 203 projected in the path of the stationary post 204. At the same time, the hook 194 is withdrawn back from the pin 195 of the governor collar. The rotation of the machine is

thereby arrested. Conversely when the flange 193 is displaced to the right, it is first disengaged from the post 204 thereupon enabling it to commence its rotation under the influence of the driving motor, and an instant later the hook 194 is brought into engagement with the pin 195 giving the spindle 45 the jerk above mentioned and efficiently and abruptly commencing the rotation of the record medium.

In view of the fact that I have taken up the operation of the various sub-combinations and organisms of the mechanism in describing their construction, it will be only necessary to recapitulate the operation of the machine very briefly. I have shown that the spring motor 22 is wound or put under tension by a pull on the cord 95 and this is accompanied, or more properly is caused by, the displacement of the button 104 to the left in the drawings. Accordingly as long as this button is located at any point to the left of its most right-hand extreme position corresponding to the limit of movement of the sound recorder or reproducer carriage, there will be tension or power enough in the driving motor for the normal operation of the machine. Stated from another standpoint, it is impossible to position the sound recorder or reproducer anywhere on the record medium without by this act imparting sufficient tension to the driving motor to cause the normal actuation of the machine through the entire remainder of the record. The foregoing considerations do not impose any restrictions on free movements of the sound recorder or reproducer back and forth on the record medium, as often as desired, or to any extent desired, or in any direction or manner desired. With the lazy-tongs, which is the normal method of operating the machine, it is automatically insured that the sound recorder or reproducer is lifted off of the record medium before it can be shifted laterally. In the case of actuation by the lever 149, it is correspondingly automatically insured that the collet 111 cannot be released without the lifting of the sound recorder or reproducer at the same time. The movement of the carriage to the right in the drawings can never be had except in the normal operation of the machine, or by releasing the collet 111, so that the record medium can never be scratched by movement of the carriage to the right under any circumstances. The record medium cannot be scratched under any circumstances by the movement of the carriage to the left when this is done by the lazy-tongs, which is the normal method. The only way therefore, that the scratching of the record medium can occur is by the operator disregarding the lazy-tongs and the lever 149 and pressing directly on the carriage to the left with sufficient force to



wind the spring motor 22 in spite of the engagement of the collet 111. This procedure is so unnecessary and unlikely on the part of any operator as to render it not worth while to especially insure against it. However I may arrange a push plate on the front of the carriage having a connection to the slider 130 so as to lift the sound recorder or reproducer whenever the carriage is pressed to the left in any manner.

The various features of the invention may of course be modified without changing their mode of operation or their results. For example, in Fig. 19 I have shown an alternative method of returning the carriage, in place of the lazy-tongs and handle 168. In this case I provide a stationary rack 210 engaged by a pinion 211 pivoted in the carriage and having a hand-crank 212 by which it is rotated. It is clear that the carriage can be returned by rotating the crank 212. In this form of the invention I have shown a vertical governor broadly denoted 213 which is geared from the motor 22 by a simple multiplying gear train 214 as clearly shown. 215 denotes bevel gears by which the vertical spindle of the governor 213 communicates its movement to the horizontal spindle 45 of the record medium.

Having described my invention, I claim:—

1. In a machine for recording or reproducing sound, a record medium, a motor adapted to store up power to rotate said record medium, a recorder or reproducer, and means actuated by a displacement of said recorder or reproducer in one direction for storing power in said motor.

2. In a machine for recording or reproducing sound, a record medium, means adapted to store up power to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for storing power in said means, and a releasable grip connection between said recorder or reproducer and said part.

3. In a machine for recording or reproducing sound, a record medium, means adapted to store up power to rotate said record medium, a recorder or reproducer, a part adapted to be displaced for storing up power in said means, and means simultaneously actuated to lower said recorder or reproducer on the record medium and grip said recorder or reproducer to said part.

4. In a machine for recording and reproducing sound, a record medium, a motor adapted to store up power to rotate said record medium, a recorder or reproducer, means actuated by a displacement of said recorder or reproducer in one direction for storing up power in said motor, and means for permitting a free movement of the recorder or reproducer without disturbing said motor.

5. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of the recorder or reproducer for reenergizing said means, and a grip connection between said recorder or reproducer and said part and adapted to be released when the recorder or reproducer is raised away from the record medium.

6. In a machine for recording or reproducing sound, a record medium, means adapted to be tensioned to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, and a collet grip connection between said sound recorder or reproducer and said part.

7. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, and a collet grip connection between said sound recorder or reproducer and said part adapted to be released when the sound recorder or reproducer is raised away from the record medium.

8. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, and means for engaging and displacing said part by a movement of said recorder or reproducer, said means including an additional releasable grip connection between said recorder or reproducer and said part.

9. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means and means for actuating said part by a movement of said recorder or reproducer, said last named means including a releasable grip connection between said recorder or reproducer and said part, said grip connection being substantially inoperative when the recorder or reproducer is raised away from the record medium.

10. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, means for actuating said part by a movement of said recorder or reproducer, and mechanism adapted to be projected



against a portion of said last mentioned means to return said recorder and reproducer and displace said part to reenergize said means.

5 11. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, means for actuating said part by a movement of said recorder or reproducer, mechanism adapted to be projected against a portion of said last mentioned means to return said recorder and reproducer and displace said part to reenergize said means, and means actuated by said mechanism for lifting the sound recorder or reproducer away from the record medium.

20 12. In a machine for recording or reproducing sound a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, a releasable grip connection between said recorder or reproducer and said part, and two separate means for releasing said connection and lifting said recorder or reproducer away from said medium.

30 13. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, a releasable grip connection between said recorder or reproducer and said part, and means acting to lift said recorder or reproducer away from the record medium, and to release said grip connection.

40 14. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, a releasable grip connection between said recorder or reproducer and said part, and means for tightening said grip connection and for lowering said recorder or reproducer on the record medium.

50 15. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a part having a movement parallel to that of said recorder or reproducer for reenergizing said means, a grip connection between some of said parts, and separate means for simultaneously raising the recorder or reproducer and releasing said grip connection.

60 16. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said rec-

ord medium, a recorder or reproducer, a slider for lifting the recorder or reproducer away from the record medium, mechanism having a pin adapted to be projected behind said slider for the purpose of returning and lifting the recorder or reproducer away from the record medium, a part having a movement parallel to that of the recorder or reproducer for reenergizing said means, and a grip connection between said recorder or reproducer and said part adapted to be released by said mechanism.

70 17. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a rod having a movement parallel to that of said recorder or reproducer and adapted to reenergize said means, a collet surrounding said rod, and means for releasing said collet and lifting the recorder or reproducer away from the record medium.

80 18. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, a rod having a movement parallel to that of said recorder or reproducer and adapted to reenergize said means, a collet surrounding said rod, and a grip-nut having a lever for releasing said collet and lifting the recorder or reproducer away from the record medium.

90 19. In a machine for recording or reproducing sound, a record medium, means adapted to be energized to rotate said record medium, a recorder or reproducer, an element connected thereto, a cord secured to said means and having a portion extending parallel to the movement of said recorder or reproducer, and a button attached to said cord and adapted to be engaged by said element connected to the recorder or reproducer, said element including a releasable grip connection between said recorder or reproducer and said cord.

100 20. In a machine for recording or reproducing sound, a record medium, a recorder or reproducer, and a spring motor having a pulley connected to said recorder or reproducer and a gear train connection to said record medium, said motor having a clutch between said pulley and said train.

110 21. An operating device in which energy may be stored in combination with a record medium and a recorder or reproducer, the said device being adapted to drive said record medium, and means whereby upon the displacement of the recorder or reproducer in a determined direction, power will be stored in the said device for the purpose set forth.

120 22. In a sound recording or reproducing machine, sound recording or reproducing means, a record medium, mechanism for ef-

fecting relative movement between parts of the sound recording and reproducing means and parts of the record medium, said record medium being revoluble at a relatively high speed and said sound recording and reproducing means being movable at a relatively slow speed, said mechanism comprising a power storing device adapted to store sufficient power to drive the machine, and an appliance for storing power in said device actuable substantially in accordance with a displacement of one of the two parts first mentioned in a determined direction with respect to the other, said mechanism further comprising elements coöperating with each other to expend a part of the stored power in moving the said parts in manner aforesaid.

23. An operating device in which energy may be stored in combination with a movable record medium and a movable recorder or reproducer, the said device being adapted to drive both said record medium and said recorder or reproducer, and means whereby upon the displacement of one of the movable parts aforesaid in a determined direction with respect to the other of said parts, power will be stored in the said device for the purpose set forth.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

JOHN H. J. HAINES.

Witnesses:

WALDO M. CHAPIN,  
WILLIAM C. LARY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





# UNITED STATES PATENT OFFICE.

WALLACE APPLETON BEATTY, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO GEORGE W. BEADLE, OF NEW YORK, N. Y.

## GRAPHOPHONE-RECORD BLANK.

1,158,964.

Specification of Letters Patent.

Patented Nov. 2, 1915.

No Drawing.

Application filed January 3, 1913. Serial No. 740,078.

*To all whom it may concern:*

Be it known that I, WALLACE APPLETON BEATTY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Graphophone-Record Blanks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to plastic products, and especially to graphophone records made from a novel compound to be disclosed below; and has for its object to produce a graphophone record which will not produce the foreign noises which are common to the present graphophone records, and will on the other hand, be more durable and less liable to wear than those which have heretofore been proposed.

To these ends the invention consists in the novel articles of manufacture composed of the novel compositions of matter more fully hereinafter disclosed and particularly pointed out in the claims.

In order that this invention may be more clearly understood, it is said:—In my prior application #702,046, filed June 6, 1912, entitled Artificial gums and process of producing the same, I have disclosed and claimed a new gum and method of making it, which method, when briefly stated, consists in forming a new compound from a mixture of acetone and phenol to which is added a small quantity of acid, in order to produce what I believe to be dioxy-diphenyl-dimethylmethane. This new compound is then further acted upon, as stated in said application above, by formaldehyde, in order to produce a further tenacious product constituting the said new gum above mentioned. This new gum is found to be inodorous, insoluble in water, is relatively strong and tenacious, and it may be colored with dyes or with other substances. I find further that this new gum when first produced, is more or less soluble in alkali; that it becomes less and less soluble after it has been heated at say 100° C., until when it has been kept at that temperature for say two hours, it is scarcely soluble at all even in strong alkali. When brought to this condition, however, acids will convert it at ordinary tempera-

tures into a mass which is insoluble in alkali. I find the gum is also soluble in alcohol, ether, acetone, glacial acetic acid, amyl alcohol, amyl acetate and acetylene tetrachlorid, or mixtures of these. It is, however, insoluble in oils, such as linseed oil, turpentine, and mineral oils. When in its insoluble condition, it is an inodorous transparent mass quite strong, non-brittle and tenacious. It is also quite hard and will not burn, unless kept continually in the flame. In this condition of the gum, I have not found any solvent for it.

As an alternative method of making the gum insoluble, I may produce a solution of the same, out of one or more of the above solvents, and add sufficient acid to give to the said solution an acid reaction, rather than an alkaline one, whereupon I have discovered that the gum, upon drying, will itself go into its insoluble condition at ordinary temperatures.

In order to make graphophone records out of this new gum, I simply dissolve it to the proper consistency, preferring to form therefrom a plastic mass, and mold the same into the proper shape, whereupon the molded mass may be subjected to the usual process of recording speech, music, or other sounds, and it may then either be heated under the proper conditions to render it hard and insoluble, or if it has been made acid, as above stated, it may be left to dry at ordinary temperatures, whereupon it will become a hard and insoluble mass. I have found whether I employ the heating step or the acid step to secure the hard condition of the gum, it is sometimes desirable to carry it out at a pressure less than that of the atmosphere in order to remove the last traces of the solvent. I have further found that the gum in assuming its solid insoluble condition, neither expands nor contracts, and especially when it is mixed with fillers to be disclosed below, and therefore, it is especially adapted for making graphophone records. Furthermore, since the gum may be procured in a transparent or in a white condition, I am enabled to produce practically white or translucent records, which in itself is a novelty in this art. In addition to the above, the gum, as above intimated, will produce practically non-inflammable records which are not acted upon by moisture, acids, and other reagents. They are further not sensitive to



changes in temperature, and therefore, the records produced from my gum are not subjected to the usual warping and distortions frequently encountered during shipment, 5 owing to the fact that the records are subjected to an undue temperature either in storage or in transit.

In addition to the use of the gum itself for the above purposes, I may also, and in 10 fact prefer to, fill this gum with a finely divided hard substance, such as very finely divided graphite, finely divided wood powder, lamp black, steel dust finely divided, or oxid of iron, such as, for example,  $\text{Fe}_3\text{O}_4$ , etc. 15 The filling of the gum is easily accomplished either by making the gum into a relatively thin solution, thoroughly stirring the same and letting it set, or even by making a more plastic mass and thoroughly working the 20 filler or fillers into it. I further find both when making the records out of the pure gum, as well as when making them out of the filled gum, it is desirable to subject the finished molded mass to a considerable pressure in a hydraulic press in order to properly 25 solidify the mass, as well as to exclude air bubbles.

Not only may I make my records out of the gum, as above disclosed, but I may also 30 make very efficient records out of the above dioxy-diphenyl-dimethyl-methane, mixed with say, cellulose acetate in the proportion of seventy-five parts of the acetate to twenty-five parts of the dioxy-diphenyl-dimethyl-methane. This mixture is readily accom- 35 plished by dissolving its constituents in a common solvent, such as acetone, and allowing it to set. The mixture may be then either used in its relatively pure condition, 40 or it may be likewise filled, as mentioned above, with various substances. I also prefer to solidify the finished molded product by pressure, as stated in connection with the gum.

45 Not only may I employ the mixture just stated, but I find it further useful to employ, under certain conditions, a mixture composed of say twenty-five parts of the dioxy-diphenyl-dimethyl-methane to say seventy- 50 five parts of nitro-cellulose, such as the trinitrocellulose employed in the manufacture

of celluloid. This cellulose mixture is treated in all respects like the first mentioned mixture.

In addition to recording directly upon the 55 new mass constituting the graphophone record blank, as above mentioned, I may either make a master record, or otherwise procure a master record, and make duplicate records therefrom out of the graphophone 60 record blanks made from each of the three substances above disclosed.

By the term ketone found in the claims I mean to include only acetone, or its immediate homologues such as ethyl-methyl-ketone, or 65 diethyl-ketone; by the term phenol I mean to include only carbolic acid and the cresols; and by the term aldehyde I mean to include only formaldehyde or its polymers, or its ammonia condensation products such as hexa- 70 methylene-tetra-amin and acetaldehyde.

It is obvious that those skilled in the art may vary the details of the procedure without departing from the spirit of my invention, and further, that homologues of the 75 compounds mentioned may be employed, and still come within the spirit of my invention. Therefore, I do not wish to be limited to the above disclosure, except as may be required by the claims. 80

What I claim is:—

1. The herein described new article of manufacture consisting of a graphophone record blank, containing a condensation product of a ketone, a phenol and an aldehyde. 85

2. The herein described new article of manufacture consisting of a graphophone record blank, containing a condensation product of acetone, phenol and formaldehyde. 90

3. The herein described new article of manufacture consisting of a graphophone record blank containing a condensation product of a ketone, a phenol, an aldehyde 95 and a filler.

In testimony whereof, I affix my signature, in presence of two witnesses.

WALLACE APPLETON BEATTY.

Witnesses:

T. A. WITHERSPOON,  
R. M. PARKER.



GRAPHOPHONE PATENT.

METHOD OF COMPARING SOUNDS

# 1,159,023-----C. M Heck,  
Patented-November 2nd, 1915.  
Filed-July 7th, 1915.

C. M. HECK.  
METHOD OF COMPARING SOUNDS.  
APPLICATION FILED JULY 7, 1915.

1,159,023.

Patented Nov. 2, 1915.  
2 SHEETS—SHEET 1.

Fig. 1.

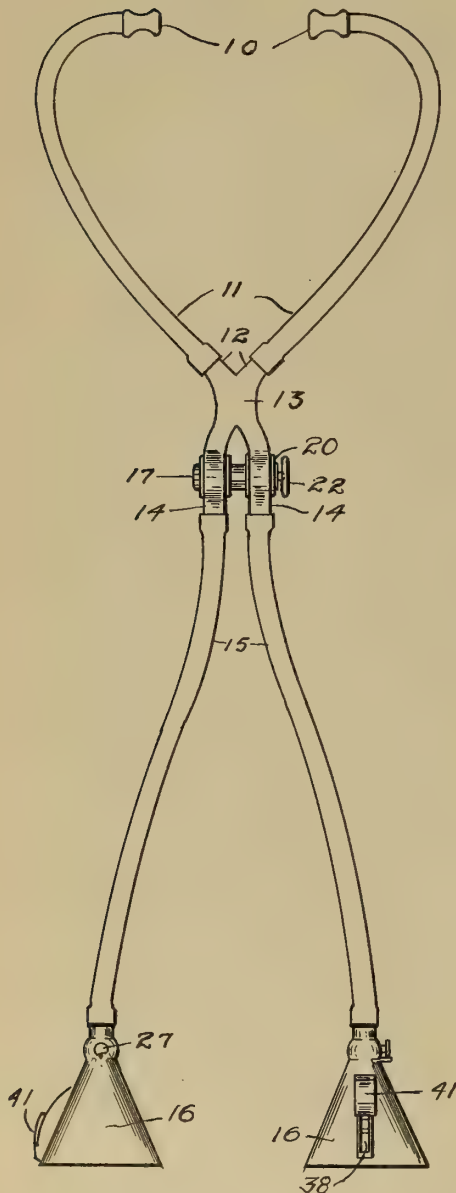


Fig. 2.

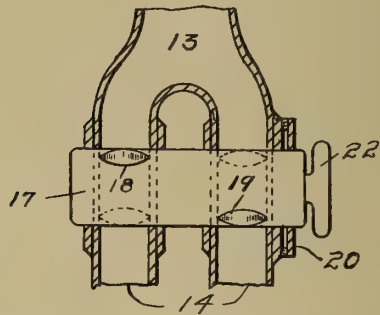


Fig. 3.



Fig. 4.

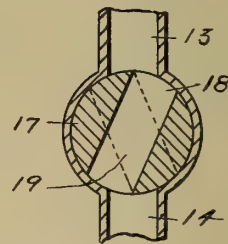


Fig. 5.

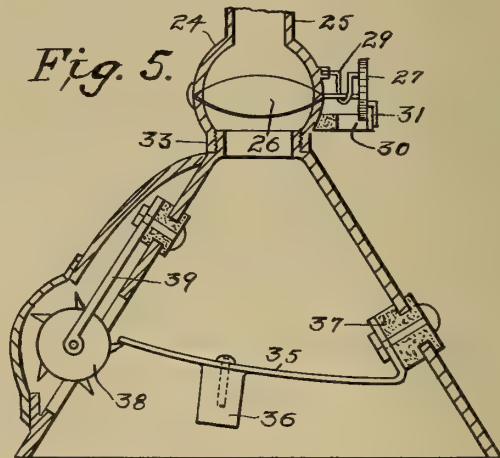
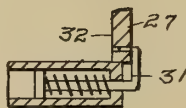


Fig. 6.



INVENTOR.  
Charles M. Heck  
BY *Wm. S. Hodges*  
ATTORNEY

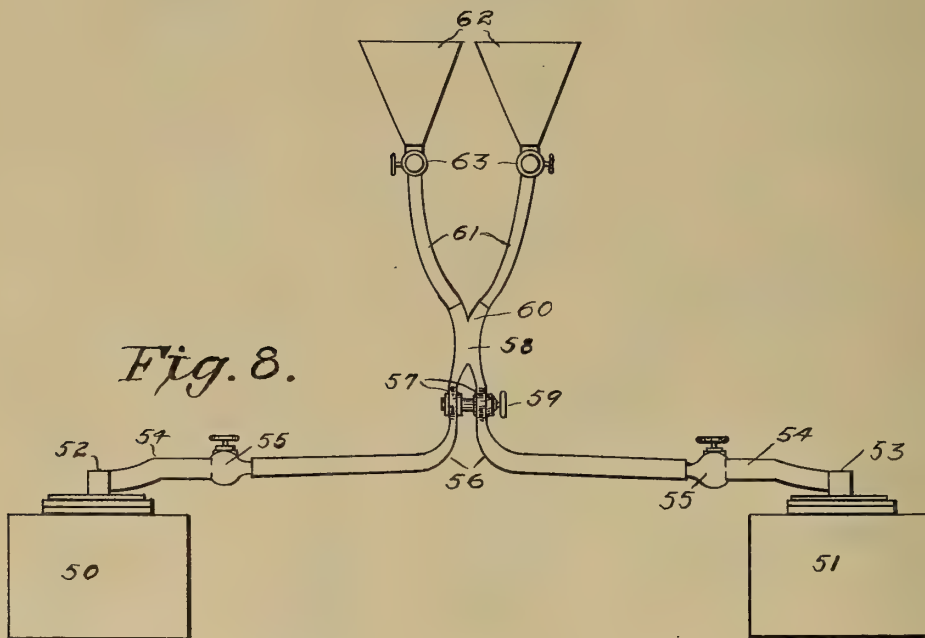
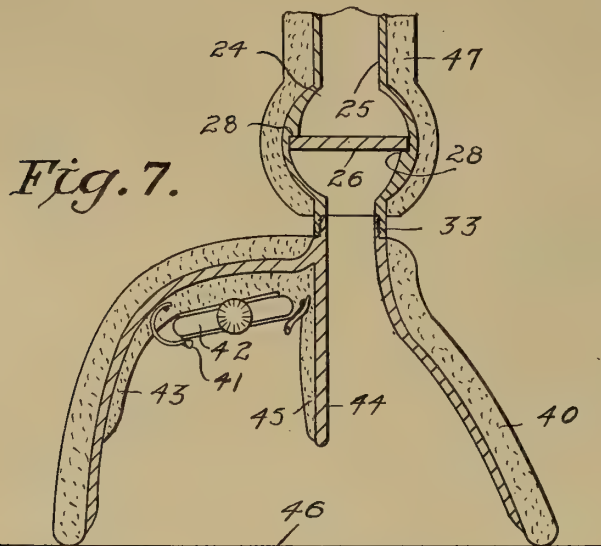




C. M. HECK.  
METHOD OF COMPARING SOUNDS.  
APPLICATION FILED JULY 7, 1915.

1,159,023.

Patented Nov. 2, 1915.  
2 SHEETS—SHEET 2.



INVENTOR.  
Charles M. Heck  
BY  
J. S. Dodge  
ATTORNEY

# UNITED STATES PATENT OFFICE.

CHARLES M. HECK, OF RALEIGH, NORTH CAROLINA.

## METHOD OF COMPARING SOUNDS.

1,159,023.

Specification of Letters Patent.

Patented Nov. 2, 1915.

Original application filed February 5, 1915, Serial No. 6,316. Divided and this application filed July 7, 1915.  
Serial No. 38,455.

*To all whom it may concern:*

Be it known that I, CHARLES M. HECK, a citizen of the United States, residing at Raleigh, in the county of Wake and State of North Carolina, have invented new and useful Improvements in Methods of Comparing Sounds, of which the following is a specification.

This invention relates to the art of sound detection and comparison.

In all observations made by the senses, impressions on the brain rapidly lose their intensity and character, the memory being thus unable to compare sensations following each other at relatively long intervals. In observations on light, some hundred fold increase of accuracy has been attained by utilizing instruments that will place two lights to be compared before the eyes at the same time, or one light after another in rapid succession.

One of the objects of the present invention is to accomplish a similar result in connection with sound observation, whereby the detection and investigation of sounds, the resonant properties of bodies, and the reflecting and absorbing quantities, may be more accurately conducted than has heretofore been possible.

A further object is to provide for efficient comparison of sounds by equalizing the volumes of the sounds being investigated, leaving the nature or character of the sounds undistributed.

A further object is to provide means whereby resonance properties of cavities may be determined and compared by percussion or impinging of sound waves.

A further object is to provide means whereby the sound reflecting properties of surfaces may be determined and compared.

A further object is to provide means for thoroughly insulating the apparatus from extraneous sounds.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawing: Figure 1 is a view of a stethoscope constructed in accordance with my invention. Fig. 2 is an enlarged detail view illustrating the sound equalizing device. Fig. 3 is an end view thereof. Fig. 4 is a diagrammatic transverse sectional view thereof. Fig. 5 is an enlarged detail view of one of the receiving

chambers. Fig. 6 is a detail of the locking device. Fig. 7 is a detail view of a slight modification. Fig. 8 is a diagrammatic view illustrating one of the uses of my invention.

Referring to the drawing, the instrument illustrated in Fig. 1 is a convenient form of the doctor's stethoscope, although it will appear later that the instrument is not limited to medical work. The stethoscope illustrated comprises the ear nipples 10, connected with tubes 11 leading from the arms 12 of a coupling 13. Said coupling is provided with lower branches 14 from which tubes 15 lead to the cups 16, designed to receive the sound in the well known manner. For convenience, the cups 16, and tubes 15, may be called receiving members, and the tubes 11 and ear pieces 10, delivery members. Said cups 16 may also be technically sound directing devices, for the reason that they perform the function of directing sounds received by them.

Rotatably supported by the coupling 13, and preferably by the branches 14, is a valve member 17 provided with openings 18 and 19, arranged at an angle with respect to each other, and located so as to control the passage of sound waves through said branches 14. The openings 18 and 19 are arranged as shown in Fig. 4, it being apparent from said figure that either tube may be open when the other is closed, or both open to the same extent at the same time, or one full open and the other open to any desired fraction. An indicating scale 20 mounted on one of the tubes 14, acting also as a cap to hold the valve member 17 in position, is provided, said cap being attached in suitable manner. The end of the valve member is provided with a head 22 having a pointer 23 coöperating with the scale 20 to indicate the adjustment of the valve. By the use of this arrangement, the valve member may be adjusted so that the volume of sound passing from branches 14 to the arms 12 will be equalized, rendering it possible to determine the nature of the respective sounds without regard to any difference in volume at the source. Thus two sounds of different volumes may be equalized as to the volume by adjusting the valve member so that the openings 18 and 19 will equalize any difference in the volume.

The receiving cup or mouth piece 16 may



be of any suitable or desirable construction. It is preferred however, to make them in two sections. One of said sections comprises a shutter chamber 24 provided with a neck 25 to enter the tube 15. Located within said chamber is a pivoted shutter or valve 26 heavy enough to shut off sound tending to pass through said chamber. The shutter or diaphragm 26 is provided with a milled head 27 by which it may be rotated, but is normally held in its closed position against shoulders 28 by means of a spring 29. When the shutter is opened and released the spring 29 causes the same to fly back to shut position. To prevent a noise as the shutter is closed, an insulated stop 30 is placed outside of the chamber 24 to engage the head 27, and thereby limit the movement of said shutter. Should it be desired to lock the shutter in open position, a spring latch 31 is provided having a finger adapted to engage an opening 32 in the head 27.

The mouth piece is detachably connected to the shutter chamber 24, in any suitable manner, as the threaded portion 33. For ordinary sound observation in connection with the usual medical use of a stethoscope, the cups may be of the usual type. For percussion testing however, a cup is employed in which is secured a leaf spring 35 to which is secured a suitable hammer 36, said spring being held in position by a suitable sound insulated clamp 37. Projecting through an opening in the wall of the cup is a ratchet wheel 38 rotatably supported by a leaf spring 39, which is also supported by a sound insulated clamp. The insulation comprises spaced apart felt-washers connected by an intermediate felt tube through which the bolt of the clamp passes. A suitable cover 41 may be provided for the ratchet wheel, in order to enable the cup to be used in the ordinary manner, if the percussion device is not to be utilized at any specific time. In operation, the open end of the cup is placed upon the surface of the body to be tested, and the hand holding the mouth piece has one finger on the ratchet and by rotating the latter the teeth thereof successively engage the leaf spring and thus make a stroke with the hammer 36. Each time that the leaf spring is released by the ratchet, the hammer 36 will strike against the surface with which the cup is in contact, and the character of the sound emitted by said surface, when struck by the hammer will, of course, vary with the nature of the body being tested. To increase the intensity of the stroke, the finger while pushing the teeth forward presses the ratchet wheel inwardly, thus elevating the spring 35 a greater distance before its release. During the foregoing operation the shutter 25 is held open. When it is desired to use the stethoscope without the percussion device,

the cover 41 is placed in position, and the shutter 25 is opened and closed, as the operator may desire, by means of a finger engaging the milled head 27.

In order to detect and determine the reflection and absorption of bodies with respect to sound, a mouth piece 40 is employed, as illustrated in Fig. 7. Said mouth-piece is provided with an internal clamping device 41 constructed to support a watch 42, or other similar sound producing device. The watch is thoroughly insulated against transmission of sound to the wall of the cup by means of suitable packing 43, of felt or similar material. The reflector is best used with a wall 44, one side of which has a felt damper 45, said wall being so shaped as to protect the shutter chamber from sounds that may come without first reflecting against the object 46, on which the mouth of the cup is placed.

All of the cups, shutter chambers, and other parts are preferably provided with an insulating covering, best illustrated in Fig. 7, so as to protect the parts of the instrument from extraneous sounds such as produced by rubbing or striking the harder parts of the apparatus. Said insulation comprises an elastic covering 47 such as sheet rubber, inclosing a loose sound absorbing felt 48.

It will be understood that while the receiving cups and their attachments and adjuncts have been illustrated and described in connection with a double stethoscope, I do not desire to limit myself in this particular, as it is obvious that the same may be applied to any of the well known forms of stethoscope without departing from the spirit of my invention.

In Fig. 8 I have illustrated a method of comparing the diaphragms of sound reproducing machines to determine differences in quality and character of sound reproduction. Referring to said figure, 50 and 51 indicate conventionally illustrated graphophones, provided with the usual diaphragms supported in suitable manner as indicated at 52 and 53. The sound receiving cups or members 54 are connected with the diaphragm supports 52, 53 and are provided with sound excluding shutters 55. Said receiving cups or members are connected by tubes 56 with the branches 57 of a coupling member 58, and a sound equalizing device 59 is preferably provided. The upper branches 60 of the coupling member are connected by tubes 61 with the delivery members 62 which are also provided with sound excluding shutters 63. Said delivery members perform the function of sound directing devices. The shutters 55 and 63 are similar in construction to shutters 26, and are provided with similar adjuncts.

In operation, the machines 50 and 51 are



operated simultaneously and the sound reproduced by each will be delivered through members 62, the shutters 63 being locked in open position. By adjusting member 59 to equalize the volumes of sound, the operator by alternately operating the shutters 55 may accurately compare the work of the two diaphragms 52, 53. If it is desired to make a comparative test of amplifying devices, they are made to perform the functions of delivery members 62, one of the shutters 55 being locked in open position. By alternately operating the shutters 63 any differences in the two amplifying devices may be readily determined.

The apparatus above described forms the subject-matter of a co-pending application filed Feb. 5, 1915, Serial No. 6316, this case being a division of said application.

Having thus explained the nature of my invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what I claim is:—

1. The method of comparing sounds which consists in causing sound found at different points to travel to a common point only through preestablished paths, controlling said sounds in said travel in such a manner as to cause them to arrive substantially undiminished at said common point, and observing said sounds at said common point separately.

2. The method of comparing sounds which consists in alternately permitting sounds to travel only through different preestablished paths to a common point, controlling the intensity of said sounds in travel, and observing said sounds arriving through each of said paths separately.

3. The method of comparing sounds which comprises permitting successively each of a number of simultaneously occurring sounds to pass only through preestablished paths to a common point, and observing the variations through said succession at said common point.

4. The method of comparing sounds which comprises successively permitting sounds occurring at different points to pass only through different preestablished paths to a common point, controlling the intensity of said sounds in said travel, and observing the variations through said succession at said common point.

5. The method of comparing sounds which

comprises successively permitting different sounds to pass through different preestablished paths to a common point, and causing said sounds to take the same direction from said point to a point of observation.

6. The method of comparing sounds which comprises successively permitting sounds found at different points to pass through preestablished paths to a common point, and causing said sounds to take the same direction from said common point to a point of observation.

7. The method of comparing sounds which consists in successively permitting different sounds to pass through different preestablished paths to a common point, causing said sounds to take a common direction from said common point of observation, and controlling the volumes of said sounds in their travel.

8. The method of comparing sounds which consists in successively permitting sounds found at different points to pass through preestablished paths to a common point and causing said sounds to take a common direction to a point of observation, and controlling the volumes of said sounds in their travel.

9. The method of comparing sounds which comprises causing sounds found at different points to travel to a common point only through definite paths and varying the volume of sound permitted to reach said common point through one of said paths to equalize the intensity of the sound at said common point.

10. The method of comparing sounds which comprises causing sounds to reach a common point only through definite paths and varying the volume of sound permitted to reach said common point through either of said paths to equalize the intensity of sound at said common point.

11. The method of comparing sounds which comprises causing sounds found at different points to reach a common point only through definite paths and varying the volumes of the sounds admitted through each of said paths in such a manner as the volume of sound admitted through one path is increased in the same proportion as the volume admitted through the other path is diminished.

In testimony whereof I have hereunto set my hand.

CHARLES M. HECK.

[The text on this page is extremely faint and illegible. It appears to be a two-column layout with dense, handwritten or printed text. The right edge of the page shows three binder holes.]

DESIGN.

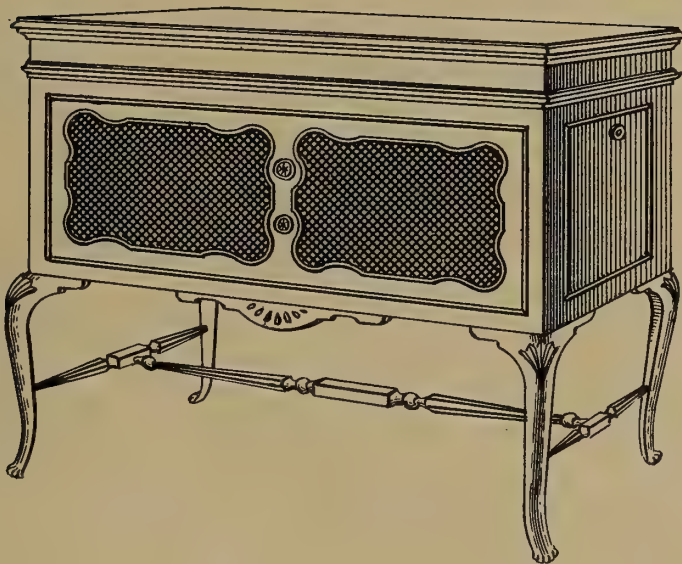
H. C. MOYER.

TALKING MACHINE CABINET.

APPLICATION FILED AUG. 11, 1915.

48,122.

Patented Nov. 9, 1915.



Witness:  
*John Enders*

Inventor:  
*Horace C. Moyer*  
by *Frd Gerlach*  
*his Atty.*





# UNITED STATES PATENT OFFICE.

HORACE C. MOYER, OF OAK PARK, ILLINOIS, ASSIGNOR TO THE WINDSOR FURNITURE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DESIGN FOR A TALKING-MACHINE CABINET.

48,122.

Specification for Design.

Patented Nov. 9, 1915.

Application filed August 11, 1915. Serial No. 45,050. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HORACE C. MOYER, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a new, original, and ornamental Design for a Talking-Machine Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

In the drawing: the figure is a perspective

of a talking machine cabinet, showing my new design.

I claim:—

The ornamental design for a talking machine cabinet as shown.

HORACE C. MOYER.

Witnesses:

MILDRED STUMPF,  
KATHARINE GERLACH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES DEPARTMENT OF THE INTERIOR

OFFICE OF THE SECRETARY OF THE INTERIOR  
WASHINGTON, D. C.

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CABINET SOUND REPRODUCING MACHINE,  
# 1,159,978-----H. C. Miller,  
Patented-November 9, 1915.  
Filed-May 19, 1909.

H. C. MILLER.  
CABINET SOUND REPRODUCING MACHINE.  
APPLICATION FILED MAY 19, 1909.

1,159,978.

Patented Nov. 9, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

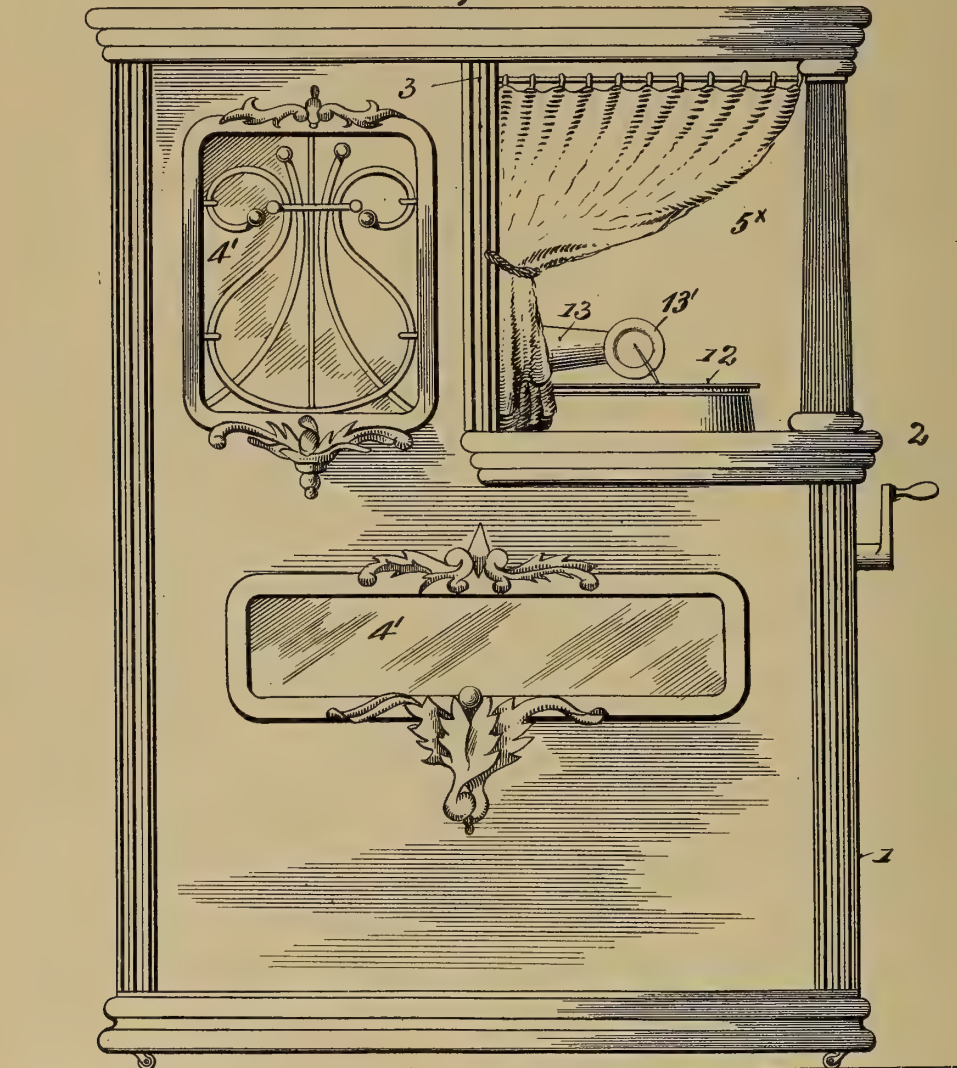
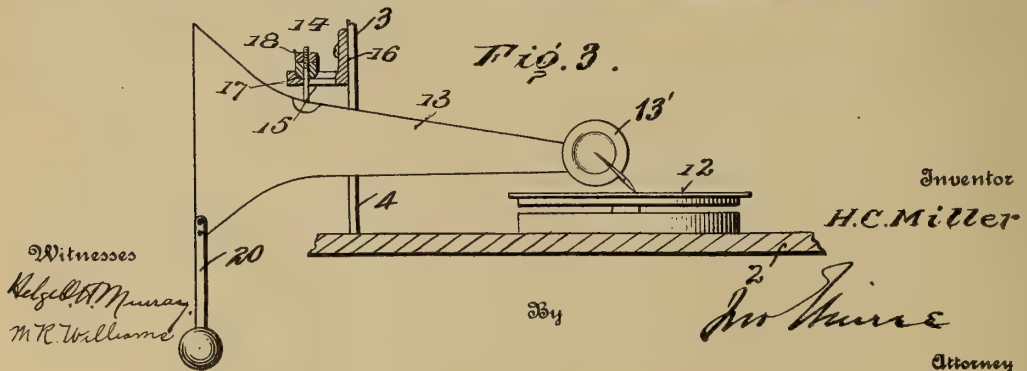


Fig. 3.





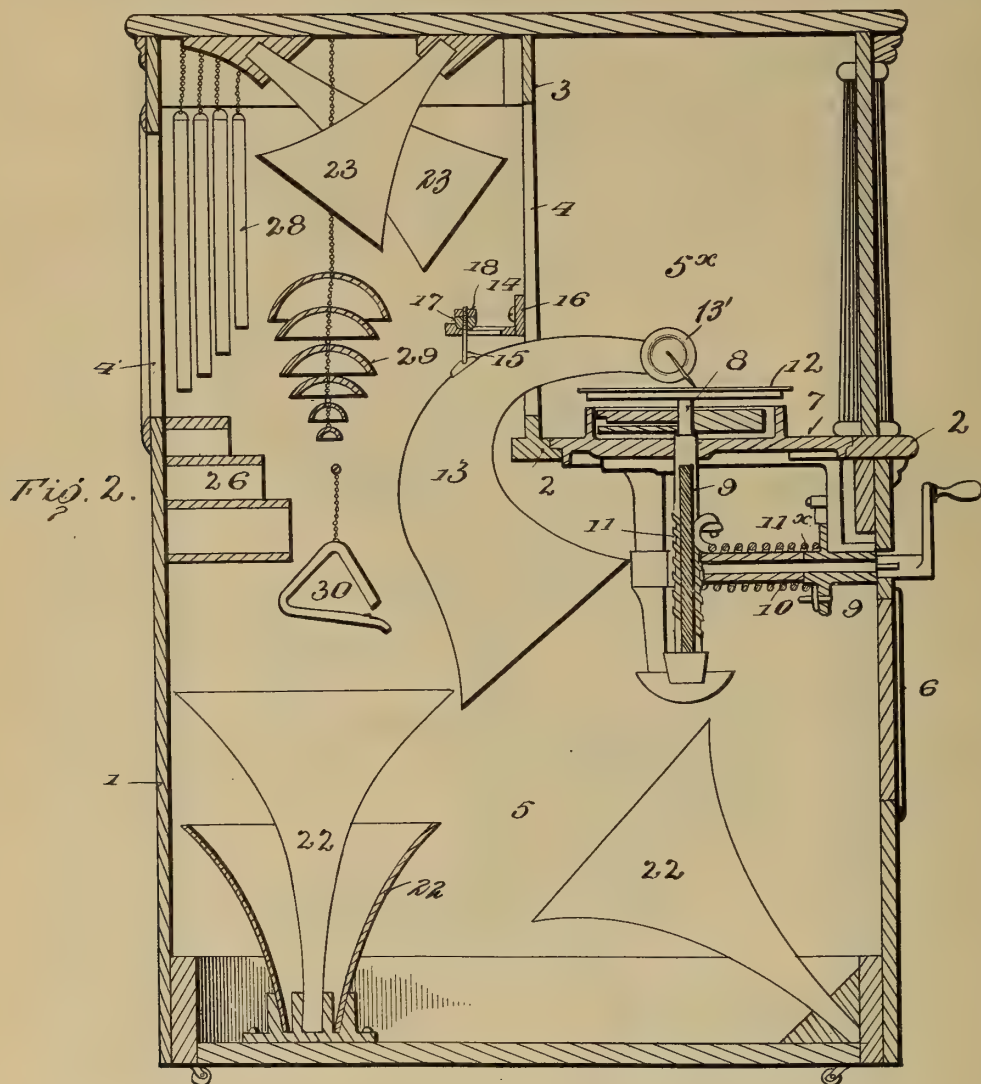


H. C. MILLER.  
CABINET SOUND REPRODUCING MACHINE.  
APPLICATION FILED MAY 19, 1909.

1,159,978.

Patented Nov. 9, 1915.

2 SHEETS—SHEET 2.



Inventor  
H. C. Miller

Witnesses

*H. C. Miller*  
M. R. Williams

*J. W. Miller*  
Attorney

# UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## CABINET SOUND-REPRODUCING MACHINE.

1,159,978.

Specification of Letters Patent.

Patented Nov. 9, 1915.

Application filed May 19, 1909. Serial No. 497,097.

*To all whom it may concern:*

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Cabinet Sound-Reproducing Machines, of which the following is a specification.

This invention relates to improvements in cabinet sound reproducing machines.

An object of the invention is to provide means, inclosed within a sound chamber, to amplify and improve the reproduced sound.

A further object of the invention is to provide improved means for supporting the amplifying horn, to permit the sound box to be moved in any convenient direction.

The invention also relates to the special details of construction and arrangement of parts, to be hereinafter described, and particularly pointed out in the claims.

In the drawings, Figure 1, is a front elevation. Fig. 2, is a transverse section. Fig. 3, is a detailed view showing my improved mounting employed with a different form of amplifier.

The numeral 1 indicates a cabinet or casing provided with two chambers or compartments designated 5\* and 5 respectively, the chamber 5\* forming a compartment for sound reproducing means, and the chamber 5 constituting a sound or diffusing chamber for the reproduced sound. In the embodiment of the invention shown in the accompanying drawings, the said chambers are formed by partitions 2 and 3, the partition 2 extending horizontally partially across the cabinet and the partition 3 extending vertically from the horizontal partition to the top of the cabinet. The chamber 5\* is arranged above the partition 2 and on one side of the vertical partition 3, while the sound chamber 5 occupies the entire portion of the cabinet below the plane of the horizontal partition 2 and also extends upwardly on the opposite side of the vertical partition from the chamber 5\*. There is an opening 4 in the vertical partition to afford communication between these two chambers and there are also one or more openings 4' through the walls of the sound chamber 5

forming sound exits. A door or removable closure 6 is provided in one wall of the sound chamber 5 at a point below the horizontal partition 2.

Supported on and depending from the partition 2, is a suitable motor for rotating a turn table 12, and in the present instance the motor comprises a base 7, counter shaft 8, power shaft 9, motor spring 10, and gearing 11, between shafts 8, and 9. It will be noted, I employ a coiled motor spring 10, one end of which is secured to a ratchet 11\*, and the other to one of the gears. The countershaft 8 extends upwardly through the horizontal partition 2 and on its upper end carries a turn table 12 located within the compartment 5\* and adapted to receive and support a sound record in the usual manner.

13, indicates a tapering amplifying horn, carrying at one end a sound box 13' and supported at 14, by a pivot or link 15, and a slotted bearing bracket 16, the latter being secured to the partition 3. The link 15, is attached to the amplifier, and extends upwardly through the bracket with its free end threaded to receive a nut 17, rounded on its under side and seated in the slot of bracket 16, the length of the link and the position of the nut being such as to normally space the amplifier from the under side of the bracket. A lock nut 18, also engages the threaded link to hold the nut 17, in set position. This construction forms among other things a pivotal support for the amplifier, and is located with reference to the latter and the sound box to relieve the weight on the record.

The amplifier passes freely through the opening 4 in vertical partition 3, into the sound chamber 5, and is crooked or curved to extend downwardly within the latter with its larger end located beneath the horizontal partition 2 adjacent the motor and in juxtaposition to the opening controlled by the door or removable closure 6.

In operation, the amplifier swings substantially horizontally across the turn table 12, on the pivot or link 15 as an axis, so as to permit the sound box to traverse a sound record supported on the said turn table. The vertical movement of the sound box into



or out of engagement with the record may be effected by raising or lowering the amplifier to give the same a bodily rectilinear movement in the direction of the pivot or  
 5 link 15, said movement being permitted by the pivot playing axially or longitudinally through the slotted bracket. The sound box may also be moved into or out of engagement with the record, by tilting the ampli-  
 10 fier on its mounting, as is permitted by the slot in the bracket and the rocking of the rounded surface of the nut 17 on its seat. It will therefore be seen that the foregoing construction provides a simple and efficient  
 15 mounting for the amplifier by means of which the amplifier may have universal and bodily rectilinear movement.

As shown in Fig. 2 of the drawings the mounting for the amplifier is inclosed with-  
 20 in the sound chamber 5, and the bracket 16, secured to the partition 3, is disposed across the opening 4, the amplifier extending freely through the portion of said opening below the bracket, and said opening also extend-  
 25 ing upwardly above the bracket and establishing communication between the chambers 5 and 5\* at a point removed from the amplifier.

In the preferred form of the invention, I  
 30 have shown the amplifier as curved downwardly as above described, but it is to be understood that a straight amplifier may be employed with this improved mounting. Such an amplifier is disclosed in Fig. 3, and  
 35 to offset the weight, due to the length, a counterweight 20, is shown attached to the enlarged end.

Supported in the diffusing or sound chamber 5, are a number of resonators, which  
 40 are regarded as one of the essential features of this invention, and serve to improve the quality of the reproduced sound, there being resonators of different forms, to respond sympathetically to various tones. Accord-  
 45 ingly I arrange within the lower portion of the diffusing chamber a plurality of horn-like or tapering tubular resonators 22, closed at their smaller ends, one of said resonators being mounted in inclined position with its  
 50 mouth located substantially opposite the mouth of the curved amplifier 13, and others of said tapering resonators 22 being nested with the wide end of the inner resonator projecting forward of the resonator sur-  
 55 rounding it. Arranged obliquely within the upper portion of the chamber 5, and at an angle to each other are other tapering tubular resonators 23 similar to the resonator 22, while intermediate the resonators 22 and  
 60 23, are a series of horizontally disposed tubular resonators 26.

Located at different points in the diffusing chamber between the above described tubular resonators are arranged additional

resonators, as shown; 28, indicating a plu- 65  
 rality of loosely suspended bars; 29, Japanese bells; and 30, a triangle.

From the foregoing description it will be clear I have produced a cabinet sound re-  
 70 producing machine which will reproduce sound in natural, full and blended tones.

In the operation of the machine the sound is amplified by the horn or amplifier 13 and is directed into the chamber 5, and is dif-  
 75 fused within the latter and acted upon by the different resonators, to bring out the less prominent tones, before the sound escapes from the cabinet to the atmosphere.

What I claim is:

1. In a sound reproducing machine, the 80  
 combination of a cabinet, a partition for dividing the cabinet into two compart-  
 ments, one of which forms a sound diffusing chamber, an opening being formed in the  
 partition for the exit of sound, a sound re- 85  
 producing machine including a reproducer, located in one of the compartments, an amplifier connected to the reproducer and extend-  
 ing into the sound diffusing chamber, actuating mechanism in the diffusion cham- 90  
 ber adjacent the end of the amplifier and resonators including open mouth horns in the sound diffusing chamber above and be-  
 low the free end of the amplifier.

2. In a sound reproducing machine, the 95  
 combination of a cabinet, a partition for dividing the cabinet into two compartments, one of which forms a sound diffusing cham-  
 ber, an opening being formed in the parti- 100  
 tion for the exit of sound, a sound repro- ducing machine including a reproducer lo-  
 cated in one of the compartments, an ampli-  
 fier connected to the reproducer and extend-  
 ing into the sound diffusing chamber, act- 105  
 uating mechanism in the diffusion chamber adjacent the end of the amplifier, resonators  
 including open mouth horns in the sound  
 diffusing chamber above and below the free  
 end of the amplifier, and open mouth res-  
 onators located intermediate the aforesaid 110  
 resonators.

3. In a sound reproducing machine, the  
 combination of a cabinet, a partition for  
 dividing the cabinet into two compartments,  
 one of which forms a sound diffusing cham- 115  
 ber, an opening being formed in the parti-  
 tion for the exit of sound, a sound repro-  
 ducing machine including a reproducer lo-  
 cated in the other compartment, an amplifier  
 connected to the reproducer and extending 120  
 into the sound diffusing chamber, actuating  
 mechanism in the diffusion chamber adja-  
 cent the end of the amplifier, resonators in  
 the sound diffusing chamber above and be-  
 low the free end of the amplifier, and res- 125  
 onators suspended intermediate the said res-  
 onators.

4. In a sound reproducing machine, the



combination of a cabinet, a partition for dividing the cabinet into two compartments, one of which forms a sound diffusing chamber, an opening being formed in the partition for the exit of sound, a sound reproducing machine including a reproducer, an amplifier connected to the reproducer and extending into the sound diffusing chamber, actuating mechanism in the diffusing chamber adjacent the end of the amplifier, resonators in the sound diffusing chamber above and below the free end of the amplifier, and resonators loosely suspended intermediate the said resonators.

5. In a sound reproducing machine, the combination with a cabinet formed with a diffusion chamber and a compartment for a sound reproducing machine, a sound reproducing machine including a reproducer and a downwardly curved amplifier connected with the reproducer and extending into the diffusion chamber and directing the sound under the compartment in which the sound reproducing machine is supported, an open mouth tone resonator located opposite the mouth of the curved amplifier, other open mouth tone resonators located above and below the mouth of the curved amplifier, and loosely suspended tone resonators mounted in the diffusion chamber.

6. In a sound reproducing machine, the combination with a cabinet, formed with an exit opening, partitions in the cabinet to provide two compartments, one of which is larger than the other, one of the partitions having an opening to establish communication between the two compartments, a sound reproducing machine supported in the smaller compartment and including a record support and a reproducer, a downwardly curved amplifier connected to the reproducer and extending below the plane of the bottom of the smaller compartment, a universal connection for suspending the curved amplifier, tone resonators in the larger compartment above and below the mouth of the downwardly curved amplifier, and loosely suspended tone resonators mounted in the larger compartment, said latter tone resonators being arranged between the first mentioned tone resonators located above and below the end of the curved amplifier.

7. In a sound reproducing machine, the combination with a cabinet, formed with an exit opening, partitions in the cabinet to provide two compartments, one of which is larger than the other, one of the partitions having an opening to establish communication between the two compartments, a sound reproducing machine supported in the smaller compartment and including a record support and a reproducer, a downwardly curved amplifier connected to the reproducer and extending below the plane of the

bottom of the smaller compartment, a universal connection for suspending the curved amplifier, tone resonators above and below the mouth of the downwardly curved amplifier and a series of horizontally disposed tone resonators in the larger compartment.

8. In a sound reproducing machine, the combination with a cabinet formed with an exit opening, partitions in the cabinet to provide two compartments, one of which is larger than the other, one of the partitions having an opening to establish communication between the two compartments, a sound reproducing machine supported in the smaller compartment and including a record support and a reproducer, a downwardly curved amplifier connected to the reproducer and extending below the plane of the bottom of the smaller compartment, a universal connection for suspending the curved amplifier, tone resonators above and below the mouth of the downwardly curved amplifier, a series of horizontally disposed tone resonators in the larger compartment and a plurality of loosely suspended tone resonators mounted in the larger compartment.

9. In a sound reproducing machine, the combination with a cabinet formed with an exit opening, partitions in the cabinet to provide two compartments, one of which is larger than the other, one of the partitions having an opening to establish communication between the two compartments, a sound reproducing machine supported in the smaller compartment and including a record support and a reproducer, a downwardly curved amplifier connected to the reproducer and extending below the plane of the bottom of the smaller compartment, a universal connection for suspending the curved amplifier, tone resonators above and below the mouth of the downwardly curved amplifier, a series of horizontally disposed tone resonators in the larger compartment, and a plurality of loosely suspended tone resonators mounted at different levels in the larger compartment and including a series of bars of different lengths and a series of concave plates.

10. In a sound reproducing machine, the combination with a cabinet formed with an exit opening, and having a horizontal partition and a vertical partition to provide a sound reproducing machine compartment and a diffusion chamber, the vertical partition having an opening, a sound reproducing machine in the sound reproducing machine compartment including a reproducer, a curved amplifier connected to the reproducer and extending through the opening in the partition and downwardly in the diffusion chamber and below the plane of the horizontal partition, means for suspending the curved amplifier at the top, and a



plurality of tone resonators located in the diffusing chamber above and below the open end of the curved amplifier and including a nest of upwardly extending open mouth resonators near the bottom of the diffusion chamber and oppositely downwardly inclined open mouth resonators near the top of the diffusion chamber.

11. In a talking machine, the combination of a cabinet provided with a sound chamber, a record support carried by the cabinet outside of said chamber, a sound-box, an amplifier supporting said sound-box and extending freely into said chamber, and means mounting said amplifier on the cabinet to permit said sound-box to move across said record support and to permit said amplifier to reciprocate bodily and perpendicularly to the record support to bring the sound-box into and out of engagement with a record on said support.

12. In a talking machine, the combination with a cabinet having a sound chamber, of a record support carried by the cabinet, a sound-box, an amplifier supporting said sound-box and extending freely within said chamber, and means mounting said amplifier in the cabinet to permit said sound-box to move across said record support, and to permit said amplifier to have bodily movement toward and away from said record support while being maintained, in the plane of said bodily movement, at all times in the same angular relation with respect to said record support.

13. In a talking machine, the combination of a cabinet having a sound chamber, a record support outside of said chamber, a sound-box, an amplifier carrying said sound-box and extending into said chamber, and means mounting said amplifier to move pivotally to traverse the record support and to reciprocate bodily and wholly in the direction of said pivot to bring the sound-box into or out of operative position with respect to the record support.

14. In a talking machine, the combination with a cabinet, of a record support carried thereby, a sound-box, an amplifier supporting said sound-box and having a portion inclosed within said cabinet, and means mounting said amplifier to move pivotally to traverse the record support and to reciprocate bodily and wholly in the direction of said pivot to bring the sound-box into or out of operative position with respect to the record support.

15. In a talking machine, the combination with a cabinet having a sound chamber, of a record support, a sound-box, an amplifier carrying said sound-box and extending within said chamber, and means mounting said amplifier on said cabinet to permit said sound-box to move across said record sup-

port and to permit said amplifier to have bodily rectilinear movement to bring said sound-box into and out of operative relation to said support, the said means including a bearing carried by said cabinet and a pivot secured to said amplifier and movable both rotatably and longitudinally in said bearing.

16. In a talking machine, the combination with a cabinet having two chambers, and an opening establishing communication between said chambers, a record support in one of said chambers, a sound-box, an amplifier carrying said sound-box and passing freely through said opening into the other of said chambers, and means mounting said amplifier in said cabinet to permit said sound-box to move across said record support, and to permit said amplifier to have bodily rectilinear movement toward and away from said record support.

17. In a talking machine, the combination with a cabinet having two chambers, and a partition between said chambers, of a record support in one of said chambers, a sound-box, an amplifier carrying said sound-box and passing freely through said partition into the other of said chambers, and means mounting said amplifier in said cabinet to permit said sound-box to move across said record support, and to permit said amplifier to have bodily rectilinear movement toward and away from said record support, the said chambers communicating through said partition at a point removed from the amplifier.

18. In a talking machine, the combination with a cabinet having a sound chamber, of a record support carried by the cabinet, a sound-box, an amplifier supporting said sound-box and extending freely within said chamber, and means mounting said amplifier in the cabinet to permit said sound-box to move across said record support and to permit said amplifier to have bodily movement toward and away from said record support while being maintained, in the plane of said bodily movement, at all times in the same angular relation with respect to said record support, the cabinet being provided in a wall of said chamber with an opening in juxtaposition to the mouth of said amplifier.

19. In a talking machine, the combination of a cabinet, including a wall and a sound chamber below said wall, a record support located upon said wall, a sound box, a crooked amplifier carrying said sound-box at one end and passing freely into said chamber with its other end located below said wall, and means mounting the amplifier to move across the record support and to have bodily rectilinear movement toward and away from the record support.

20. In a talking machine, the combination

with a cabinet having a sound chamber, of  
a resonator comprising a plurality of nested  
tapering tubular elements, the wide end of  
the inner element projecting forward of the  
5 element surrounding it, and sound repro-  
ducing means communicating with said  
chamber.

In testimony whereof I have affixed my  
signature in presence of two witnesses.

HENRY C. MILLER.

Witnesses:

WM. F. PALMER,

FRANCIS A. MARTIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."





ATTACHMENT FOR GRAMOPHONES,  
# 1,160,146-----S. Dayan,  
Patented-Nov. 16, 1915.  
Filed-December 18, 1914.

S. DAYAN.  
ATTACHMENT FOR GRAMOPHONES.  
APPLICATION FILED DEC. 18, 1914.

1,160,146.

Patented Nov. 16, 1915.

FIG. 1.

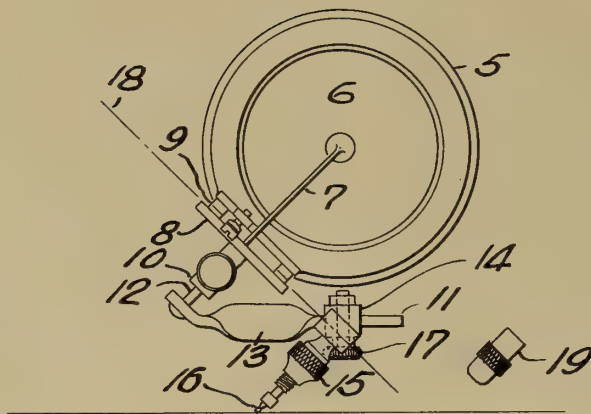


FIG. 2.

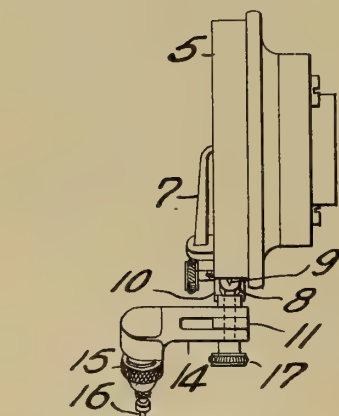
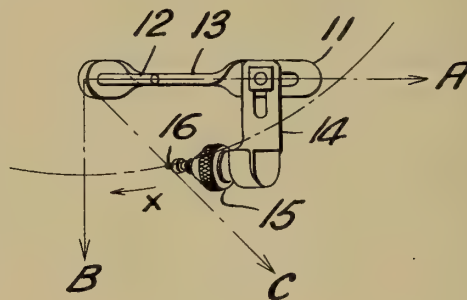


FIG. 3.



Witnesses

*S. M. Allen*  
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Inventor

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By *Arthur J. Haugh*  
Attorneys



# UNITED STATES PATENT OFFICE.

SYLVAIN DAYAN, OF MONTREAL, QUEBEC, CANADA.

## ATTACHMENT FOR GRAMOPHONES.

1,160,146.

Specification of Letters Patent.

Patented Nov. 16, 1915.

Application filed December 18, 1914. Serial No. 877,901.

*To all whom it may concern:*

Be it known that I, SYLVAIN DAYAN, a citizen of the Dominion of Canada, and resident of the city of Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Attachments for Gramophones, of which the following is a full, clear, and exact description.

This invention relates to improvements in attachments for gramophones, and the object is to provide a device by means of which any gramophone designed to use a steel needle may be equipped with a jeweled needle.

Two types of disk records are manufactured for gramophones, one having lateral undulations in the groove, that is undulations on the side of the groove and the other having undulations in the bottom of the groove. The former type is adapted for steel needles and the latter jeweled needles. It will thus be seen that an entirely different motion is transmitted to the sound box diaphragm by the two types of record, and therefore a sound box adapted for the type of record producing lateral vibrations will not operate if used on a record producing vertical vibrations.

The attachment forming the subject of the present invention is a means for transforming vertical vibrations into lateral vibrations, necessary to a sound box adapted to receive only lateral vibrations.

The device consists essentially of a short arm adapted to be mounted in the needle socket and to extend under the sound box in the same plane as the sound box diaphragm. This arm carries an offset socket containing the jeweled needle, the offset being such that the movement of the needle with the undulations of the record imparts a rolling motion to the arm which is transmitted to the sound box in the proper direction.

In the drawings which illustrate the invention:—Figure 1 is a front elevation of a sound box with the attachment in place. Fig. 2 is a side elevation. Fig. 3 is a plan view of the attachment.

Referring more particularly to the drawings, 5 designates a sound box of any suitable design having a diaphragm 6 of mica or other appropriate material, to the center of which one end of a stylus lever 7 is rigidly connected. The opposite end of this lever

is rigidly connected to a rocking plate 8, mounted preferably on knife bearings 9 on the sound box. A needle socket 10 projects from the opposite side of the plate 8 from the lever 7. When a steel needle is used, the lateral movement of the needle is transmitted to the lever 7, which produces vibration of the diaphragm. It will thus be seen that the needle and lever 7 are for all practical purposes a continuous lever fulcrumed on the bearings 9. The attachment consists of an arm 11 having at one end thereof a rigid pin 12 adapted to enter the needle socket. This arm may be twisted, as shown at 13, to acquire a maximum of rigidity. The pin 12 is mounted in the arm preferably at an angle of 45° thereto, as this is the normal angle of the lever 7 to the record, and the arm 11 is thus held in horizontal position. A block 14 is mounted on the arm and carries a clutch or socket 15 at the outer side of the lever, that is, the side remote from the sound box, as clearly shown in Fig. 2. This socket is mounted at an angle of 45° to the arm, that is to say, parallel with the lever 7, and carries the jeweled needle 16 in exactly the same relation to the record that a steel needle would be held in the socket 10. This socket and needle are hereafter referred to as the "stylus." A locking screw 17 may be provided on the block 14 to permit the adjustment of the device through the medium of the slot in 11 to different sizes or makes of sound box, so as to bring the point of connection of the stylus and arm substantially into the imaginary line 18, which is the axis of oscillation of the stylus lever and needle socket. A protective cap 19 may be provided for the stylus point.

In Fig. 3, a diagram is incorporated showing the proper location of the needle. The line A represents the projection of the plane of the diaphragm on the plane of the record, which moves under the needle in the direction of the arrow X. The arrow point on line A indicates the movement of the needle relatively to the record. As, however, the record grooves are curved, there is a constant force, line B acting on the needle at right angles to the line A. The proper position of the needle is with its point on the line C, which is the bisectrix of the angle between lines A and B.

When the device is placed in position on a sound box, the pin 12 is inserted in the needle socket, with the bar arranged under

the edge of the sound box and in the same plane with the diaphragm, as clearly shown in Figs. 1 and 2, so that the socket 8 projects at the outer side of the sound box, the block being adjusted to bring the needle point on the bisectrix C as above described, and the block in line with the two bearings 9. The point of the needle is thus well under the sound box, so that the tendency to revolve the sound box, which exists to a marked degree with the ordinary steel needle, is practically eliminated. Vertical movement imparted to the needle point from the record is transmitted as a vertical movement through the socket 15 to the block 14. Owing to the forward extension of the block beyond the arm, the movement has a rocking tendency on the arm. This rocking tendency is, however, not around the axis of the arm but around the imaginary inclined line passing through the bearings 9 and block. The arm and needle socket thus produce a rocking of the plate 8, which imparts the necessary lateral motion to the lever 7. There is a certain change in the direction of forces, that is, from the vertical movement of the outer end of the block 14 to an oscillating or rocking movement around the imaginary inclined axis.

30 Having thus described my invention, what I claim is:—

1. The combination with a diaphragm, a stylus lever, and a needle socket forming the continuation thereof, of an arm mounted in the needle socket and arranged at an angle

of 45° to the stylus lever in substantially the plane of the diaphragm, and a stylus carried by the arm parallel with the stylus lever and out of the plane of the diaphragm.

2. The combination with a diaphragm, a stylus lever, and a needle socket, of an arm mounted in the needle socket arranged in the same plane as the diaphragm, and a stylus carried by the arm having its record engaging portion out of the plane of the diaphragm, the point of connection between the stylus and arm being substantially in the same inclined line as the axis of oscillation of the stylus lever.

3. The combination with a diaphragm, a stylus lever, and a needle socket, of an arm in the plane of the diaphragm, a pin at one end thereof mounted in the needle socket and arranged at an angle to the arm, a block mounted on the arm and projecting out of the plane of the diaphragm, a stylus on said block parallel with the stylus lever and out of the plane of the diaphragm, and means for permitting adjustment of said block on the arm to bring its point of connection to said arm substantially into line with the axis of oscillation of the stylus lever.

In witness whereof, I have hereunto set my hand, in the presence of two witnesses.

SYLVAIN DAYAN.

Witnesses:

S. R. W. ALLEN.

C. W. TAYLOR.

GRAMOPHONE,

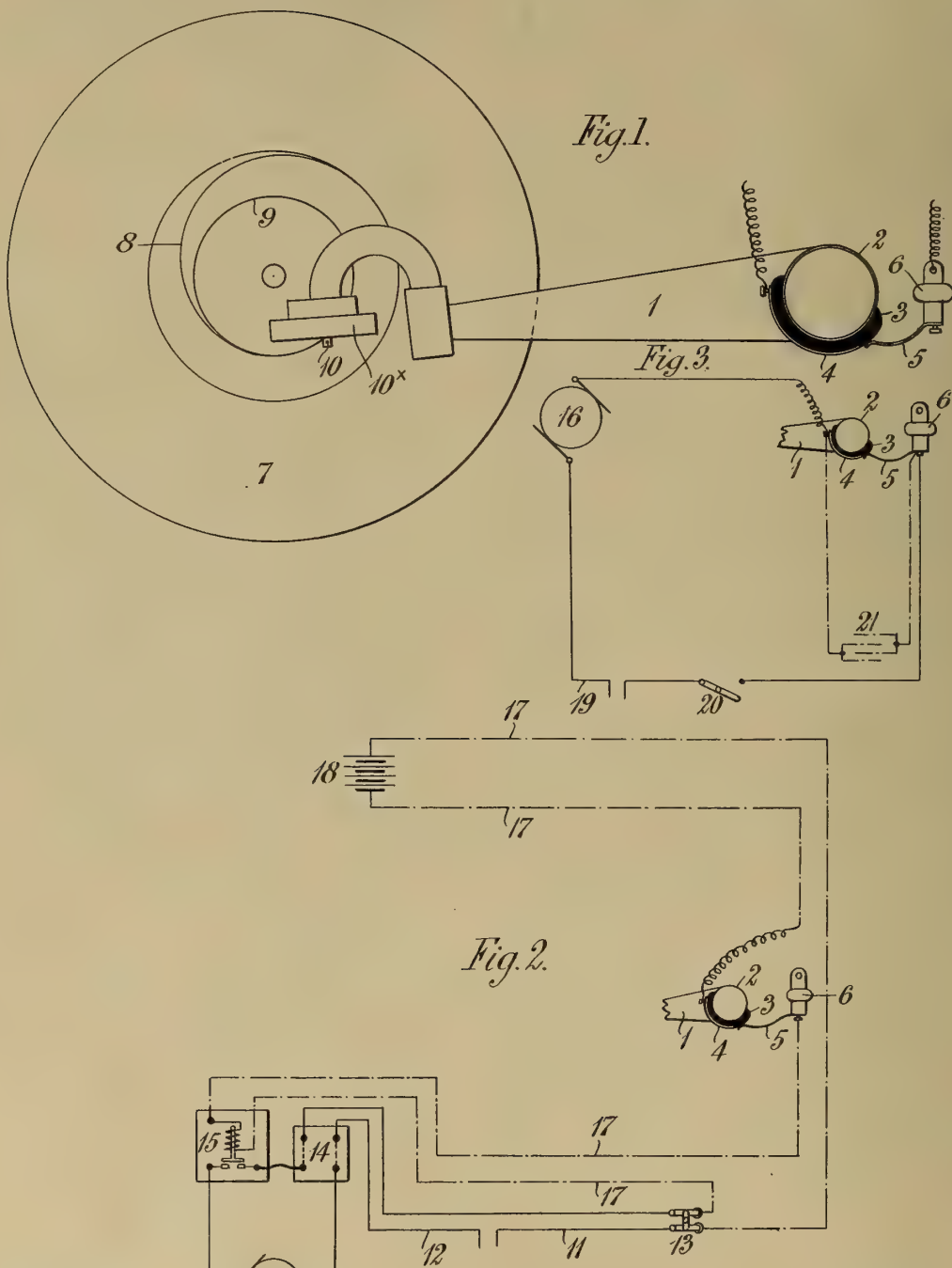
# 1,160,268-----R. W. De La Rue,  
Patented-Nov. 16, 1915.  
Filed-Dec. 14, 1914.



R. W. DE LA RUE.  
GRAMOPHONE.  
APPLICATION FILED DEC. 14, 1914.

1,160,268.

Patented Nov. 16, 1915.



Witnesses  
M. E. Burrell  
C. F. Early

Inventor  
Reginald Warren de la Rue  
By his attorneys,  
Baldwin Wright

# UNITED STATES PATENT OFFICE.

REGINALD WARREN DE LA RUE, OF NEWMARKET, ENGLAND.

## GRAMOPHONE.

1,160,268.

Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed December 14, 1914. Serial No. 877,252.

*To all whom it may concern:*

Be it known that I, REGINALD WARREN DE LA RUE, a subject of the King of Great Britain, residing at The Lodge, Six Mile Bottom, Newmarket, county of Cambridge, England, have invented new and useful Improvements Relating to Gramophones, of which the following is a specification.

This invention relates to the starting and stopping of the electric motors by which gramophones are sometimes driven.

The term "gramophone" is intended to include all talking machines of a similar type in which a rotating record disk is used.

According to this invention an electric circuit is made and broken by the movement of the tapered arm carrying the sound box and the electric motor for driving the gramophone is thereby started and stopped.

In one way of carrying out the invention the current is led by a brush carried by a bracket on a stationary part of the gramophone to a segment of conducting material secured to but insulated from the vertical part of the tapered arm, the segment being so arranged that the circuit is made when the arm is placed in the starting position and broken when the tune or reproduction is finished. In order to insure a complete break in the circuit the needle is guided to the center of the record at the end of the reproduction by a groove or a raised line.

To minimize the sparking between the segment and brush which causes a roughness which interferes with the swinging of the arm, I employ a relay operated by a battery of small E. M. F. to make and break the current which operates the motor, or in place of a relay I connect a condenser to the segment and brush.

In the drawings which illustrate the invention Figure 1 is a diagrammatic view showing the conducting segment on the tapered arm of a gramophone the circuit being broken. Fig. 2 is a diagram showing the electrical connections. Fig. 3 is a diagram showing an alternative method for minimizing sparking when the circuit is broken.

1 is the tapered arm, the vertical part 2 of which carries insulating material 3, to which is secured the conducting segment 4.

5 is the brush for conveying the current, carried by the bracket 6 on a stationary part of the gramophone.

The record disk 7 is provided with a

groove or ridge 8 and a circular groove 9, so that at the end of the reproduction, the needle 10, and sound box 10', together with the tapered arm, are moved quickly toward the center of the record disk, thereby quickly and definitely breaking the circuit.

In Fig. 2, 11, 12 are the mains, the main 11 passing through the double switch 13 to the fuse block 14 and thence through the relay 15 to the electric motor 16 driving the record, the other main 12 leading to the fuse block 14 and thence to the other terminal of the motor 16. 17 are the wires of a low E. M. F. circuit. The current passes from the battery 18 to the segment 4, thence by the brush 5 and bracket 6 to the relay 15, through the double switch 13 and back to the battery 18.

In Fig. 3 the current from the main 19 passes through the motor 16, segment 4, brush 5 and switch 20, and a condenser 21 is connected to the segment 4 and brush 5, to prevent sparking when the circuit is made or broken by the movement of the tapered arm 1.

The operation is as follows:—The tapered arm is moved by hand away from the center of the record disk 7 and the needle 10 placed at the outer edge of the disk. As soon as the conducting segment 4 comes into contact with the brush 5 the circuit is completed and the motor started. When the reproduction is finished the needle and tapered arm are quickly moved by the groove 8 to the groove 9 thus causing the segment 4 to leave the brush 5 and make a rapid break in the circuit thus stopping the motor.

What I claim is:—

1. In a gramophone, the combination with the record disk of a sound-box-carrying arm, an insulated conducting segment carried by the arm, a stationary brush bearing for a time on the segment, a motor for the disk and circuit wires connecting the motor with the segment and brush.

2. In a gramophone, the combination with a record disk of a sound-box-carrying arm, an insulated conducting segment carried by the arm, a stationary brush bearing for a time on the segment, a motor for the disk and circuit wires connecting the motor with the segment and brush, said disk being provided with means for moving the sound box carrying arm suddenly at the end of the record to quickly separate the segment from the brush.



3. In a gramophone, the combination with  
a record disk of a sound-box-carrying arm,  
an insulated conducting segment carried by  
the arm, a stationary brush bearing for a  
5 time on the segment, a motor for the disk,  
circuit wires connecting the motor with the  
segment and with the brush, and means for  
preventing sparking between the brush and  
segment.
- 10 4. In a gramophone the combination of an  
electric motor, a rotating record disk, a piv-  
oted arm carrying a sound box and needle,  
an insulated conducting segment concentric  
with the arm pivot, a stationary brush, a  
15 lead from the conducting segment to one  
terminal of the motor and a second lead  
from the stationary brush to the other  
terminal of the motor, the segment and  
brush being so adapted that the brush rests  
20 upon the segment when the pivoted arm is in  
a position such that the needle is upon an  
acting portion of the record but not when  
the record is finished.
- 25 5. In a gramophone the combination of  
an electric motor, a rotating record disk, a  
pivoted arm carrying a sound box and  
needle, an insulating conducting segment  
concentric with the arm pivot, a stationary  
brush, a lead from the conducting segment
- to one terminal of the motor, a second lead 30  
from the stationary brush to the other termi-  
nal of the motor, and means to prevent  
sparking between the segment and the brush  
which are so adapted that the brush rests 35  
upon the segment when the pivoted arm is  
in a position such that the needle is upon an  
acting portion of the record but not when  
the record is finished.
6. In a gramophone the combination of an  
electric motor, a rotating record disk, an 40  
arm carrying a sound box and needle, an  
insulated conducting segment concentric  
with the arm pivot, a stationary brush, a  
lead from the conducting segment to one  
terminal of the motor, a second lead from 45  
the stationary brush to the other terminal  
of the motor, and a condenser connecting  
the conducting segment to the stationary  
brush which are so adapted that the brush  
rests upon the segment when the pivoted 50  
arm is in a position such that the needle is  
upon an acting portion of the record but not  
when the record is finished.

REGINALD WARREN DE LA RUE.

Witnesses:

FRANK P. NEWMAN,  
HERBERT COMBER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

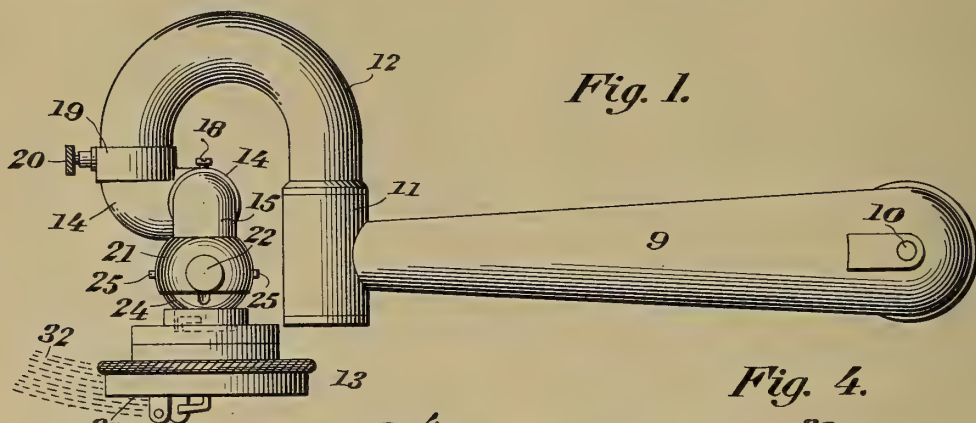


REPRODUCER SUPPORT FOR GRAPHOPHONES,  
#1,160,803 -----G. C. White,  
Patented-November 16, 1915.  
Filed-May 25, 1914.

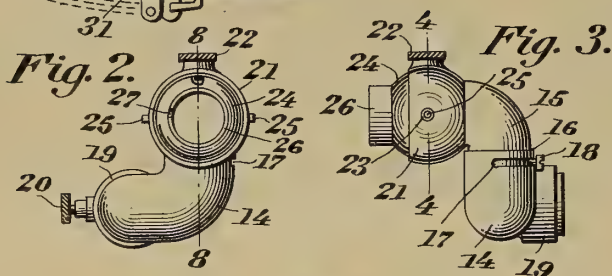
G. C. WHITE.  
 REPRODUCER SUPPORT FOR GRAPHOPHONES.  
 APPLICATION FILED MAY 25, 1914.

1,160,803.

Patented Nov. 16, 1915.

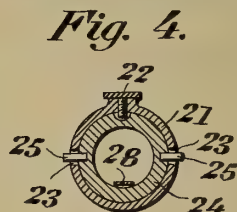


*Fig. 1.*

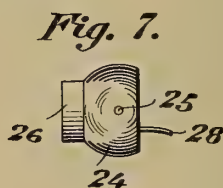


*Fig. 2.*

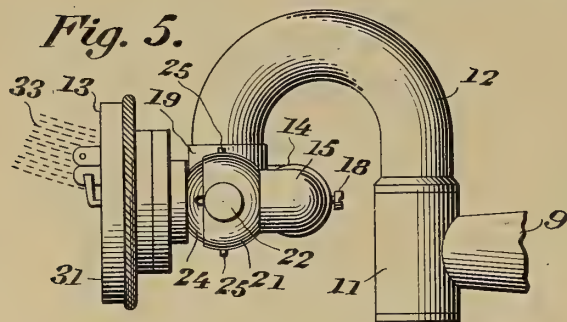
*Fig. 3.*



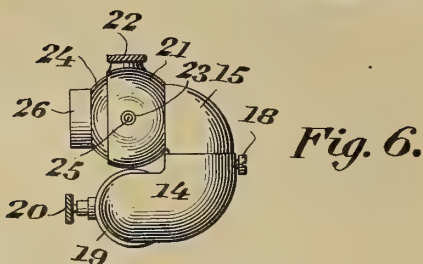
*Fig. 4.*



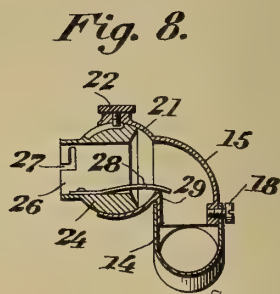
*Fig. 7.*



*Fig. 5.*



*Fig. 6.*



*Fig. 8.*

Witnesses  
 M. F. Hammett  
 B. K. Halker

George C. White

Manu T. Co.

Attorneys

# UNITED STATES PATENT OFFICE.

GEORGE C. WHITE, OF BALTIMORE, MARYLAND.

REPRODUCER-SUPPORT FOR GRAPHOPHONES.

1,160,803.

Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed May 25, 1914. Serial No. 840,653.

*To all whom it may concern:*

Be it known that I, GEORGE C. WHITE, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Reproducer-Supports for Graphophones, of which the following is a specification.

This invention relates to an improved means for sustaining reproducers of graphophones.

The object of the invention is to provide an improved means for sustaining reproducers so as to enable the same to have a freedom of movement not heretofore permitted and to also provide a reproducer support that will enable the reproducer to have a playing position substantially tangential with respect to the grooves in the record disk, or substantially crosswise of the said disk grooves.

At the present time two distinct forms of record disks are employed and commercially known as Victor or Columbia records and Edison records. In the case of the Victor and Columbia records the side wall of the record disk groove is provided with irregularities with which the reproducer needle contacts so as to reproduce the sound. In the case of the Edison records the grooves of the disk are provided with irregularities in the bottom of the groove. In the Victor and Columbia disks the grooves of which have an irregular side wall, the reproducer in practice is sustained vertically so that its diaphragm will have position substantially tangential with respect to the grooves, whereas in the case of the Edison disks with the grooves of irregular bottom, the reproducer in practice is sustained in a horizontal position. The respective positions of the reproducers with respect to the two forms of grooves as above noted are necessary.

My invention therefore has for its object to provide a reproducer support of such construction that the reproducer may be carried so as to operate with disk records of either of the types referred to.

With these and other objects in view, the invention is illustrated in the accompanying drawing, wherein,—

Figure 1, shows in top plan, a conventional reproducer arm of the Victor type to which my improved device is attached,—the reproducer being in position to operate with either a Victor or Columbia disk rec-

ord. Fig. 2, illustrates a side elevation of the improved attachment with the reproducer detached. Fig. 3, shows a rear elevation of the same. Fig. 4, illustrates a cross-sectional detail on the line 4—4 of Fig. 3. Fig. 5, shows a top plan of the attachment carrying the reproducer and in position to cooperate with a disk record of the Edison type. Fig. 6, shows the same in side elevation with the reproducer removed. Fig. 7, illustrates in side elevation a detail of the universal ball part of the joint on which the reproducer is to be attached, and Fig. 8, shows a vertical sectional detail through the attachment,—the section being taken on the line 8—8 of Fig. 2.

Referring to the drawing the numeral 9, designates a tubular arm which in practice is usually pivoted at 10, so its outer smaller end may swing horizontally over the record disk. In the present instance the outer smaller end of this arm is provided with a sleeve 11, which pivotally sustains a tubular coupling 12, as is well known in the Victor machine. In practice in the Victor machine the reproducer 13, is usually attached to the forward end of the coupling while in the Columbia machine the attachment of the reproducer is made directly to the small end of the arm 9, but in either case my improved device will be attached and interposed between the said reproducer and the said arm.

By referring particularly to Figs. 2 and 3 of the drawing, it will be noted that the improved attachment mainly comprises two elbow members 14 and 15 respectively which are telescopically engaged at 16, so that the upper elbow member 15, may be rotated or swung with respect to the lower elbow member 14. The up-turned end of the lower elbow member 14, is provided with a circumferential segment slot 17, and the down-turned end of the elbow member 15, is provided with a stop screw 18, which passes through said slot so as to limit the extent of rotation of the upper elbow with respect to the lower elbow. The lower elbow member 14, has a coupling collar 19, by means of which it may be attached to either the coupling 12, in the case of a Victor machine or directly to the arm 9, of a Columbia machine. In the present instance a binding screw 20, is provided on the coupling collar 19, to effect a rigid attachment to that part which it engages.

The upper elbow member 15, carries a



semi-circular socket member 21, which has an adjusting screw 22, at its upper side and said socket is also provided with side perforations 23, in its directly opposite sides and in line with its horizontal axis. A ball member 24 snugly fits said socket 21, and carries two horizontally-projecting pins 25,—one in each side, that extend outwardly therefrom and pass freely through the side perforations 23, in the socket member so as to have a freedom of movement in said perforations. The outer side of the ball member is provided with a circular band portion 26, with a bayonet slot 27, in its edge whereby it may readily receive the reproducer 13, in the usual way. A spring finger 28, is secured inside of the circular band of the ball member and projects rearwardly so as to engage a shoulder 29, in the socket member,—said spring serving to yieldingly act on the band portion of the ball member when the reproducer is attached thereto and thus the pressure of the needle against the wall of the disk grooves is a yielding pressure that will permit the reproducer to yield in a direction at right angles to the movement allowed between the sleeve 11 and coupling 12. The upper curved surface of the ball member is provided with a groove, into which the screw 22, projects from the socket member, as clearly shown in Figs. 4 and 8 of the drawing, said screw being loose in the groove so as to permit a limited movement of the ball in the socket.

In the operation of the device the attachment may be readily connected to the arm 9, or to the coupling 12, at the point where the reproducers have heretofore been attached, while the reproducer will be connected to the band 26, of the ball member 24.

When it is desired to use the reproducer in connection with a Victor or Columbia disk record in which the side wall of the record grooves is provided with the irregularities, the upper elbow member 15, will be swung on the lower elbow 14, so that the flat face side 31, of the reproducer 13, will have position in a vertical plane substantially parallel with the longitudinal axis of the arm 9. When the reproducer is in this position its face 31, will have a position in a plane that is substantially tangential with respect to the record disk grooves, as indicated by the broken curved lines 32, in Fig. 1, of the drawing, and in this position the matter, of which the disk is a record, will be reproduced. When it is desired to use the reproducer in connection with an Edison record in which latter the irregular wall of the groove is at the bottom, the upper elbow 15, will be swung on the lower elbow to the position shown in Figs. 5 and 6 of the drawing in which the flat outer face 31, of the

reproducer will have position in a vertical plane substantially at right angles to longitudinal axis of arm 9, and cross-wise of the grooves of the record disk as indicated by broken lines 33, in Fig. 5 of the drawing. It will thus be seen that by simply shifting the one reproducer from a position where its face will be substantially on a tangent with respect to the record disk grooves to a position where such face will extend crosswise of said grooves, either a record of the Victor type or a record of the Edison type may be played.

Having described my invention what I desire to secure by Letters Patent is:—

1. In a reproducer support for graphophones the combination with an elbow member having means to connect it with a swinging graphophone arm, of a second elbow member having one end rotatably connected with the first named elbow member said second elbow member having a ball and socket connection and said connection having means for engaging a reproducer.

2. In a reproducer support for graphophones the combination with a reproducer, of a ball member of a ball and socket joint, connected to said reproducer; a socket member of said ball and socket joint, to receive said ball member; an elbow member carrying said socket member and a second elbow member rotatably connected to said first named elbow member said second elbow member having means to connect it with a graphophone arm.

3. In a reproducer support for graphophones the combination with two elbow members rotatably connected and having means to limit the rotating movement, of a ball and socket connection carried by one of said elbow members; yielding means in the interior of said connection and means for connecting the ball and socket connections to a reproducer.

4. In a reproducer support for graphophones the combination with a reproducer, of a ball member connected to said reproducer said ball member having a groove in one side and pivot pins at diametrically opposite sides; an elbow having a socket member to receive said ball said socket member provided with a pin to enter the ball-groove and also having perforations to receive the pivot pins on the ball member; a swinging arm, and means for rotatably connecting the elbow with respect to the swinging arm.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE C. WHITE.

Witnesses:

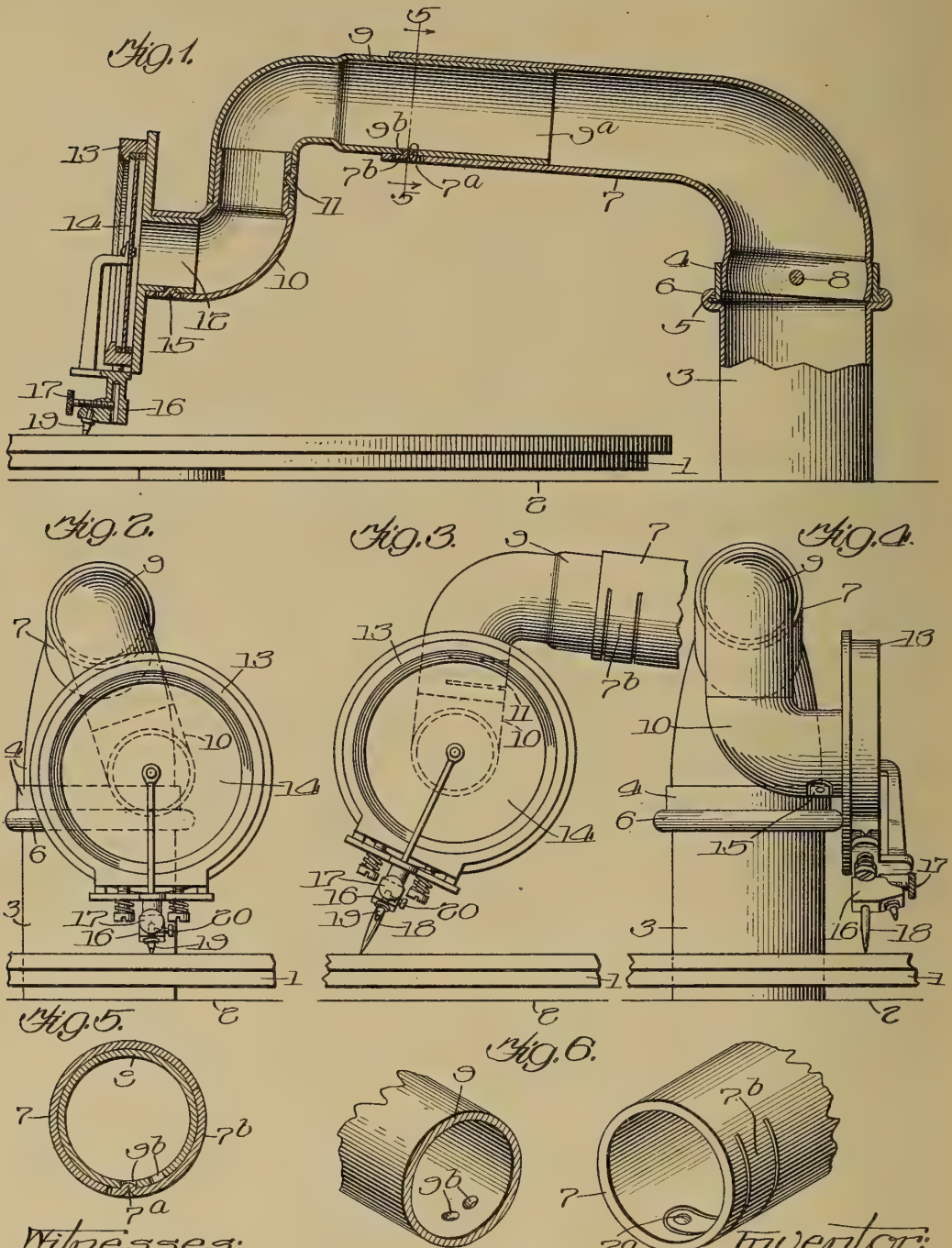
M. F. GANNETT,  
B. K. WALTER.

GRANVILLE PEARSON.  
TALKING MACHINE,  
# 1,160,998-----T. Isaac,  
Patented-November 16th, 1915.  
Filed-August 11th, 1913.

T. ISAAC.  
TALKING MACHINE.  
APPLICATION FILED AUG. 11, 1913.

1,160,998.

Patented Nov. 16, 1915.



Witnesses:  
Jno. B. Nelson Jr.  
Edwin Wilson

Inventor:  
Theodor Isaac.  
By William Rothchild  
Att'y



# UNITED STATES PATENT OFFICE.

THEODOR ISAAC, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-THIRDS TO LOUIS SCHRAM  
AND JACOB ROTHSCHILD, BOTH OF CHICAGO, ILLINOIS.

## TALKING-MACHINE.

1,160,998.

Specification of Letters Patent, Patented Nov. 16, 1915.

Application filed August 11, 1913. Serial No. 784,079.

*To all whom it may concern:*

Be it known that I, THEODOR ISAAC, a subject of the Emperor of Germany, and having legally declared my intention of becoming a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

My invention relates to talking machines and more particularly to the tone arm and sound box thereof, the object of the invention being to provide a construction such that the sound box may be quickly and easily adjusted to play records either of the Berliner type in which the groove has lateral vibrations or of the Edison type in which the groove has vertical vibrations—that is, variations in depth. As a result of my invention the machine may be quickly adjusted to play records differing as to type of groove and records varying as to feed,—records such as those commercially known as Victor and Columbia records feeding from the circumference of the disk toward the center, and others such as the Pathé Frères feeding from the center toward the circumference.

Another object of my invention is to provide a needle holder and a jewel holder on the sound box so constructed that when the needle is in place it will hold the jewel up out of contact with the record, and when the needle is removed, the jewel may be lowered into contact with the record.

I accomplish my objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a tone arm and sound box employing my invention. The parts are adjusted for the playing of an Edison type disk record. Fig. 2 is an end view looking toward the right in Fig. 1. Fig. 3 is a side elevation of the sound box and adjacent portion of the tone arm showing the parts adjusted to play a Berliner type record. Fig. 4 is a view looking toward the right in Fig. 3. Fig. 5 is a sectional view of the tone arm taken on the line 5—5 Fig. 1. Fig. 6 shows in perspective the interfitting portions of the tone arm.

Similar numerals refer to similar parts throughout the several views.

The tone arm may be supported from any direction, but in the form of machine selected to illustrate the invention the arm is supported from beneath and delivers its sound downward. In this particular construction the record is carried upon a rotary table 1 mounted upon a box or cabinet, the upper surface whereof is represented by the line 2. The sound is delivered to the cabinet or horn through the stationary delivery duct 3. The tone arm is articulately supported at the delivery end upon said delivery duct. In the present instance the joint is formed by a collar 4 having an annular flange 5 working within a beading 6 formed at the upper end of the delivery duct. Said collar is thus rotatable and permits the arm to be swung horizontally in any direction. The delivery section 7 of the tone arm is pivoted to the collar 4 by pins or trunnions 8 which extend horizontally and permit the arm to swing in a vertical direction. By this combination, the tone arm is free to swing in any direction within reasonable limits.

The free end of the delivery section 7 of the tone arms is cylindrical and receives the cylindrical end 9<sup>a</sup> of the elbow section 9. The interfitting cylindrical portions form a telescopic connection which permits section 9 to be moved longitudinally of section 7. It also permits section 9 to be rotated relatively to section 7 about the median line of the latter as an axis. This makes a rigid but at the same time an adjustable connection between the parts. The elbow section 9 is held locked in playing position by suitable locking means, the preferred form of which is shown in detail in Figs. 5 and 6. In this form one or more recesses 9<sup>b</sup> are formed in the part 9 and a spring detent 7<sup>a</sup> is constantly urged inward to enter them by a spring 7<sup>b</sup>. Said spring may be a separate piece but is preferably an integral part of section 7.

The free end of the elbow section 9 is cylindrical and interfits with the elbow section 10, preferably in the same manner as section 9 interfits with section 7. It is desirable also that yieldable locking means be provided for holding the elbow sections 9 and 10 in fixed relative position during the act of playing. These locking means, indicated at 11, Fig. 1, may appropriately be of the same form as shown in Figs. 5 and 6.

The free end of the second elbow section 10 is cylindrical and interfits with the collar 12 formed at the back of the sound box 13. The median line of said collar passes  
 5 through the center of the diaphragm 14 of the sound box and therefore receives the sound from the diaphragm and transmits it to the tone arm. On account of the interfitting construction the sound box is rota-  
 10 table upon elbow section 10 about an axis perpendicular to the center of the diaphragm. Locking means shown at 15, Fig. 1, are desirable and these may appropriately be of the same construction as the parts  
 15 illustrated in Figs. 5 and 6.

The sound box is provided with a needle holder 16 having a set screw 17 for removably holding the needle 18 in position. A  
 20 jewel holder 19 is removably mounted in the needle holder 16 and held there by a set screw 20 or other appropriate means. The jewel holder is short and projects but a slight distance below the bottom of the  
 25 needle holder and as result, when a needle is in position in the holder, it will hold the jewel up out of playing position. When the needle is removed, the jewel holder may be lowered on to the record for playing.

In operation, when a Berliner type of  
 30 record is to be played, a needle is introduced into the holder and the sound box and elbow sections are relatively adjusted in such manner as to bring the parts into the position shown in Figs. 3 and 4. When it is desired  
 35 to play an Edison type of record, the needle is removed and the sound box and elbow sec-

tions are adjusted to the position shown in Figs. 1 and 2. The locking devices shown are releasable by mere rotary pressure and conversely are automatic in their locking ac-  
 40 tions, and the locking apertures corresponding to the apertures 9<sup>b</sup> are so located in the various parts as to hold the elements of the tone arm and the sound box in proper play-  
 45 ing position either for a Berliner or Edison type record. The rotatability of the sound box about an axis perpendicular to the center of its diaphragm also facilitates the placing and removal of the needle for when  
 50 the needle is to be removed or replaced, the sound box may be rotated about its axis to bring the needle holder up to a point where it is readily accessible.

Having thus described my invention, what I claim as new and desire to secure by  
 55 Letters Patent, is:

In a talking machine, a tone arm comprising a pivotally mounted delivery section, an elbow section interfitting and tele-  
 60 scopically connected therewith, and a second elbow section interfitting and revolvably connected with the first named elbow section, the telescopic portions being formed with integral interlocking means for hold-  
 65 ing the parts in adjusted position.

In witnesses whereof, I have hereunto subscribed my name in the presence of two witnesses.

THEODOR ISAAC.

Witnesses:

MARTIN CONNOR,  
 K. M. JOHNSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



DESIGN.

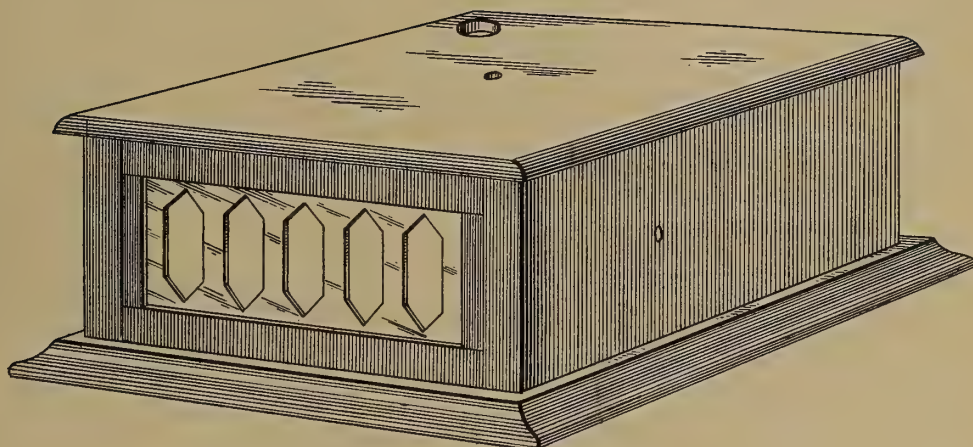
L. MARKELS.

PHONOGRAPH BOX OR CABINET.

APPLICATION FILED MAY 18, 1915.

48,188.

Patented Nov. 23, 1915.



WITNESSES

*L. Hauerstein*  
*E. Bradway*

INVENTOR

*Leonard Markels*

BY *Mumford*  
ATTORNEYS





# UNITED STATES PATENT OFFICE.

LEONARD MARKELS, OF NEW YORK, N. Y., ASSIGNOR TO CHAMPION GRAPHAPHONE COMPANY, INC., OF NEW YORK, N. Y.

DESIGN FOR A PHONOGRAPH BOX OR CABINET.

48,188.

Specification for Design.

Patented Nov. 23, 1915.

Application filed May 18, 1915. Serial No. 28,980. Term of patent  $3\frac{1}{2}$  years.

*To all whom it may concern:*

Be it known that I, LEONARD MARKELS, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new, original, and ornamental Design for a Phonograph Box or Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a phonograph box illustrating my improved design.

I claim:

The ornamental design for a phonograph box or cabinet, as shown.

LEONARD MARKELS.

Witnesses:

C. BRADWAY,

PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES PATENT OFFICE

INVENTION OF

THE UNITED STATES OF AMERICA

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DEPARTMENT OF COMMERCE

OFFICE OF THE COMMISSIONER OF PATENTS

WASHINGTON, D. C.

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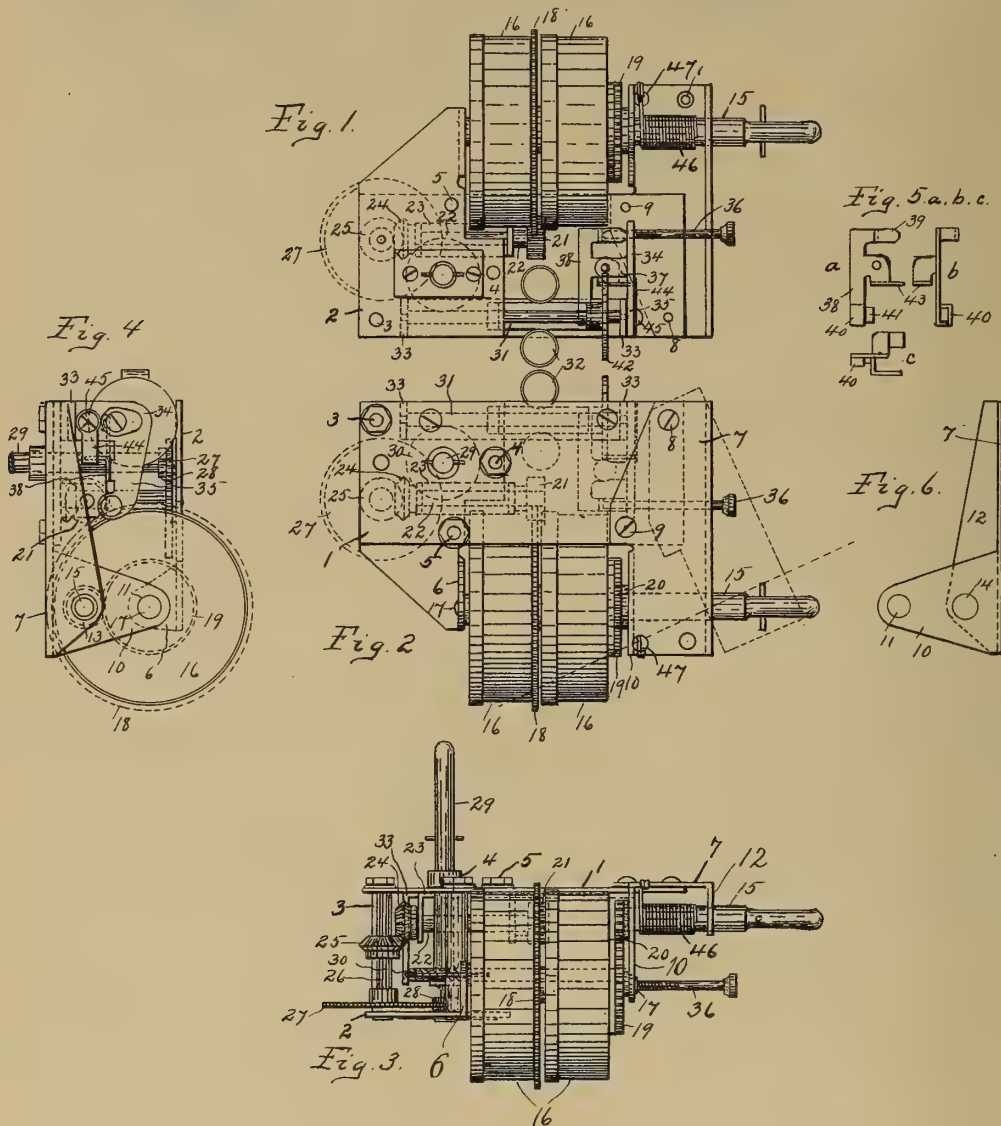


SPRING MOTOR FOR TALKING MACHINES,  
# 1,162,033-----P. Catucci,  
Patented-November 30, 1915.  
Filed-September 24, 1914.

P. CATUCCI.  
 SPRING MOTOR FOR TALKING MACHINES.  
 APPLICATION FILED SEPT. 24, 1914.

1,162,033.

Patented Nov. 30, 1915.



WITNESSES:  
 J. L. Green.  
 L. H. Gray

Pliny Catucci INVENTOR.  
 BY  
 Louis M. Sanders, ATTORNEYS.

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## SPRING-MOTOR FOR TALKING-MACHINES.

1,162,033.

Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed September 24, 1914. Serial No. 863,277.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Spring-Motors for Talking-Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to make and use the same.

My invention relates to spring motors for talking machines of the disk type, and has for its object the general improvement of the structure of such motors as well as the specific improvement in a detachable connection for the spring barrel of such motors.

It quite frequently happens, in the general and varied use to which talking machine motors are put, that the spring or springs within the spring barrel of the motor will break. Under such conditions it is necessary to return the motor to the factory for repair. Again, the user of the talking machine may require the substitution of a longer spring, thereby permitting the motor itself, when wound up, to run longer than it would with the spring ordinarily placed within the spring barrel. These and other conditions arise which make it necessary to remove the spring barrel from the motor frame for repair, the substitution of another spring barrel, or for any other possible purpose, and my invention relates more specifically to the means by which the spring barrel and its contained spring may be removed from the motor frame without disturbing any of the other parts thereof.

In the accompanying drawings Figure 1, is a bottom plan view of my improved motor. Fig. 2, is a top plan view of the same. Fig. 3, is a side elevation of the motor. Fig. 4, is an end elevation. Fig. 5, *a*, *b*, and *c*, are views respectively of one of the details in plan, side and end elevation. Fig. 6, is a detached side elevation of the main shaft bearing plate.

Similar reference numerals refer to like parts throughout the specification and drawings.

In order that a full understanding of the operation of the motor may be had, I have given a complete description of the same, although it is to be understood that in the main the description is directed to the means for detachably supporting the spring bar-

rel and main shaft. The motor frame consists of the top plate 1, of rectangular shape, provided with bearing apertures for the upper ends of the various gear shafts; and the bottom plate 2, which is of L-shape. The two plates 1 and 2, are secured together by means of the spacing studs 3, 4 and 5, in the usual manner. Extending upwardly from the bottom plate 2, is the bearing 6, provided with a suitable aperture to receive the main shaft hereinafter more fully described.

Looking at Fig. 2, upon the right hand end of the plate 1, will be seen the detachable or pivoted bearing plate 7. This plate 7 is secured to the upper face of the plate 1, by means of the two screws 8 and 9. The bearing plate 7 is provided with the downwardly extending bearing support 10, apertured as at 11, in alinement with the corresponding aperture in the bearing 6, of the lower plate. The free edge of the plate 7 is provided with a downwardly extending strengthening flange 12, of triangular shape and provided at its widest portion with an aperture 13, in vertical alinement with the corresponding aperture 14, in the bearing support 10. The two apertures 13 and 14 are designed to form a bearing for the winding shaft 15.

The spring barrels 16, are of the type shown in my Patent No. 1,029,852, June 18th, 1912, wherein tandem springs are shown and described. The two spring barrels 16, are mounted upon the sectional shaft 17, upon which is also mounted a driving gear 18, said gear being rigidly connected to one of the spring barrels 16, and meshing with the first driven gear of the train. Upon the opposite end of the shaft and outside of the right hand spring barrel, is rigidly secured a second gear wheel 19. Upon the inner end of the winding shaft 15 is located a driving gear 20, engaging the gear 19. From this structure it will be readily understood that the turning of the winding shaft by means of the usual crank will result in winding up the spring in the right hand barrel which in turn will exert its pressure through the sectional shaft 17, upon the other spring barrel and thereby wind up the spring therein so that both springs are wound simultaneously and give the result or effect of a single spring, double the length of one of the springs within the spring barrels 16.



As above indicated, the bearing plate, with its support 10, for the main spring shaft 17, is secured to the upper plate 1, by means of the screws 8 and 9. If, for any reason, it is desired to remove the spring barrels 16, and their shaft 17, from the frame of the machine, it is only necessary to remove the screw 9, when, of course, the bearing plate 7 may be swung into the dotted line position as shown in Fig. 2, carrying with it the winding shaft 15 and gear 20, while the bearing aperture 11 is released from the right hand end of the shaft 17. In this position the spring barrel 16 may be readily moved from the other bearing 6 and replaced by another spring barrel if desired, and returned to position. This may be done without even removing the motor from its case.

The driving gear 18 engages a gear 21 upon the shaft 22, which latter shaft is carried in a bracket 23, secured to the under face of the upper plate 1. The opposite end of the shaft 22 is provided with the bevel gear 24, meshing with a similar gear 25, upon the vertical shaft 26; the latter shaft being carried in suitable bearings in the plates 1 and 2. Rigidly secured to the lower end of the shaft 26, is a comparatively large gear wheel 27 which engages a smaller gear 28, upon the mandrel shaft 29; the latter shaft extends upwardly through the upper plate 1 to a considerable distance and is designed to receive the tablet support for the record. Rigidly secured to this mandrel shaft is a driving worm wheel 30, which meshes with a worm on a worm shaft 31, which latter carries the usual governor 32. The shaft 31 is mounted in a suitable bracket hanger 33 secured to the under face of the plate 1.

As a means for regulating the speed of the motor through the governor, I provide the following mechanism. Upon the bracket 33, I secure a plate 34 providing the same with a lateral extension 35. At the free end of said bracket extension I provide a threaded aperture to receive the governing screw 36. About midway of the length of the bracket extension 35, I provide a lateral bearing support 37, upon which is pivoted the brake lever 38. This brake lever is shown in detail in Fig. 5, *a*, *b* and *c*. At the upper end of the lever, as shown in said figure, there is an L-shaped projection 39, the free end of which is designed for contact with the inner face of the bracket extension 35, while the vertical portion of said L-shaped extension is in alinement with the inner end of the regulating screw 36, so that as said screw is screwed back and forth the brake lever 38, being pivoted upon the bracket extension 37, may swing back and forth. Upon the free end of said brake lever 38, I provide a loop 40, to receive the

brake felt 41, which bears upon the brake disk 42 of the governor as will be readily understood, and is usual in structures of this character. As a means for yieldingly holding said brake felt away from the disk 42, I provide the brake lever 38 with an upward and forward extending projection 43 in position to bear upon a flat spring 44, which latter is secured by means of the screw 45 to the bracket 34, as clearly shown in Fig. 4. The tendency of such spring 45, is to swing the brake lever 38 upon its pivot, away from the brake disk 42, and causing the opposite end to bear upon the governing screw 36. If, now, the governor screw 36 is screwed inwardly it will cause the brake lever to pivot with the brake felt 40, bearing upon the rotating disk 42. This braking mechanism may serve also to completely stop the motor if desired.

As a substitute for the usual pawl and ratchet mechanism upon the winding shaft, I substitute a well known equivalent in the form of a coil spring 46, closely embracing said shaft, having one end thereof carried upward and coiled through an aperture 47 in the end plate 7, as clearly shown in Figs. 1 and 3. The rotation of the shaft 15, by means of the usual crank, has a tendency to uncoil the spring and thus loosen its grip upon the surface of the shaft, thus permitting the free rotation thereof in one direction. Of course, the tendency of the driving spring in the spring barrel 16, is to rotate the shaft in the opposite direction, but the moment this tendency becomes effective the spring 46 hugs the shaft so closely as to effectually prevent rotation in the direction opposite to the usual winding.

From the above description, it will be seen that the winding shaft 15 and its gear 20, are carried by the bearing plate 7. The bearing extension 10 supports one end of the spring shaft 17, while the opposite end is supported by the bearing support 6, so that when the screw 9 is removed and the plate 7 swung into the dotted line position, the gear 20 swings clear of the gear 19 and the spring barrels 16, together with the gear 18, may be readily removed from the motor frame without disturbing any other element of the motor.

In case a single spring barrel is desired in place of a double spring barrel, such spring barrel may be mounted upon a solid driving shaft of standard length to fit the bearings 11 and 6. Of course if a plurality of spring barrels such as indicated in my prior patent above referred to are desired, then the upper plate 1 may be extended and the bearing plate 7 secured to such extension, for it will be readily understood that a third or even a fourth spring mounted upon a correspondingly sectional shaft 17, would not change the location of the driv-



ing gear 18, since that is always located adjacent to the last spring barrel in the series.

From the above description it will be seen that I accomplish the object of my invention by means at once simple and thereby I am able to obviate some of the serious difficulties in the use of talking machine motors.

I claim:

1. In a spring motor, the combination of a motor frame, a driving shaft having a spring barrel mounted thereon, means for detachably mounting said shaft and spring barrel upon said frame comprising a bearing rigidly connected to said frame for carrying one end of said shaft, and a second bearing support pivotally mounted upon said frame for supporting the other end of said shaft and means for rigidly securing said second bearing support to said frame.

2. In a spring motor, the combination of a motor frame, a gear train mounted in said frame, a driving shaft upon said frame, said shaft having a gear thereon for driving said gear train, means for detachably supporting said shaft upon said frame comprising a bearing for one end of said shaft rigidly mounted upon said frame, and a detachable bearing for the other end of said shaft, said detachable bearing being provided with means whereby it may be rigidly secured to said frame to support the other end of said shaft or swing upon a pivot to release said shaft and permit its removal from said frame without disturbing said gear train.

3. In a spring motor, the combination of a motor frame comprising upper and lower plates, spacing studs for rigidly securing said plates together, a gear train mounted in said frame between said plates, a spring driven driving shaft having a gear thereon for driving said gear train, means for detachably supporting said driving shaft upon said frame comprising a rigid bearing support upon one of said plates for supporting one end of said shaft, and a detachable bearing support upon one of said plates for supporting the other end of said shaft, means whereby said detachable support may be either rigidly secured to said plate to support said shaft, or swing upon a pivot to release said shaft and permit its removal from said frame without disturbing the gear train.

4. In a spring motor, the combination of a motor frame comprising upper and lower frame plates with spacing bolts rigidly connecting said plates together, a gear train supported by and between said plates, a driving shaft having a gear connection with said train for driving the same, and means for detachably supporting said driving shaft in said frame comprising a rigid bearing support mounted upon one of said frame plates for supporting one end of said shaft,

and a pivoted bearing support for the other end of said shaft, and means for rigidly but detachably securing said support to one of said frame plates whereby said shaft may be disconnected from it without disturbing said gear train.

5. In a spring motor, the combination of a motor frame, a gear train mounted in said frame, a driving shaft having a gear thereon for driving said gear train, means for detachably supporting said driving shaft upon said frame comprising a rigid bearing for one end of said shaft and a pivoted bearing for the other end of said shaft, means for rigidly securing said pivoted bearing to and releasing it from said frame whereby said shaft may be firmly held in said frame or released therefrom without disturbing said gear train.

6. In a spring motor, the combination of a motor frame, a spring driven shaft mounted in bearings in said frame, one of said bearings being rigidly connected to said frame and the other of said bearings being rigidly connected to said frame but having a detachable connection therewith whereby said bearing may be swung upon a pivot to release said shaft from said frame.

7. In a spring motor, the combination of a motor frame and a spring driven driving shaft mounted to rotate in said frame, a bearing for one end of said shaft integral with said frame, and a bearing for the other end of said shaft, said latter bearing having means for rigidly connecting it to said frame or for permitting it to swing upon a pivot whereby said shaft may be released from said frame.

8. In a spring motor, the combination of a pair of frame plates rigidly connected together, a driving shaft whose axis is parallel to and located between said plates, a bearing for one end of said shaft integral with one of said plates, and a bearing for the other end of said shaft rigidly but detachably connected to the other of said plates whereby upon the removal of said detachable connection said driving shaft may be removed from said bearings.

9. In a spring motor for talking machines, the combination of a pair of upper and lower frame plates spaced apart but rigidly connected together, a bearing support integral with and extending upwardly from the lower frame plate, and a bearing plate pivotally secured to the upper frame plate, a downwardly extending bearing support integral with said bearing plate, means for rigidly securing said bearing plate to said frame plate and a horizontal shaft mounted in said bearing supports, said shaft having mounted thereon a gear wheel for driving a train of gears carried by said frame plates.

10. In a spring motor, the combination of upper and lower frame plates spaced

apart and rigidly connected together, a spring driven driving shaft mounted upon said frame plates, one of said bearings being integrally connected to the lower frame plate  
5 and the other of said bearings being mounted in a bearing plate, said bearing plate being rigidly but detachably connected to the upper frame plate, and a winding shaft carried by said bearing plate having gear connections with said driving shaft.  
10

11. In a spring motor for talking machines, the combination of upper and lower frame plates spaced apart and rigidly connected together, a gear train located between  
15 said frame plates, a spring driven shaft having gear connections with said gear train for driving the same, bearings for said gear shaft upon said frame plates comprising an upwardly extending bearing support in-

tegral with the lower frame plate, a bearing plate rigidly but detachably connected to the upper frame plate, a downwardly extending bearing support integral with said bearing plate for the other end of said shaft, and a winding shaft carried in bearings  
20 upon said bearing plate said winding shaft having gear connections with said driving shaft whereby upon detaching said bearing plate from said upper frame plate the driving shaft may be detached from the frame  
25 without disturbing the gear train.  
30

In testimony whereof, I have hereunto set my hand this 19th day of Sept., 1914.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,  
NORMAN E. ZUSI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

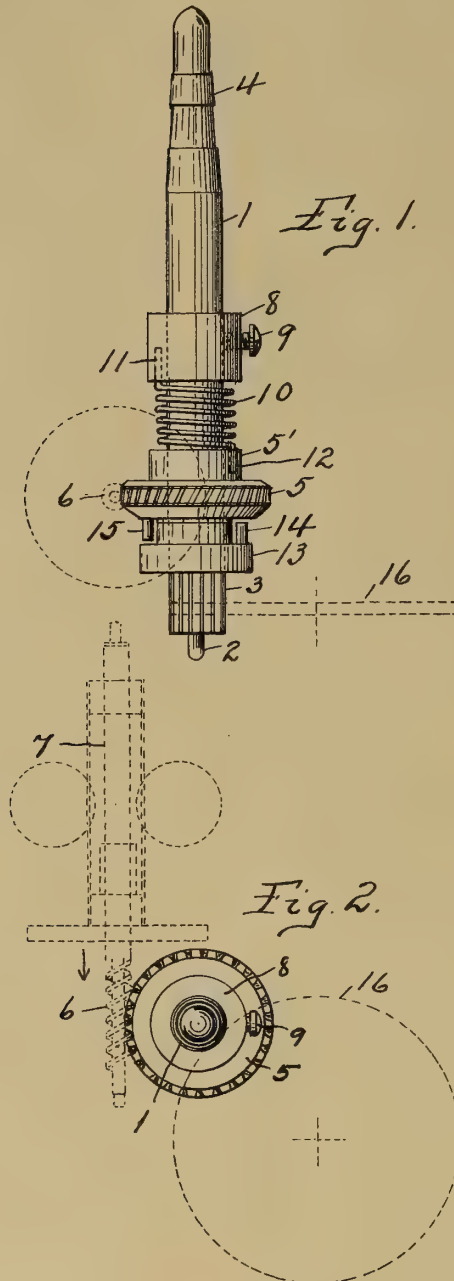


MANDREL FOR TALKING MACHINES,  
# 1,162,034-----P. Catucci,  
Patented-November 30, 1915.  
Filed-April 5, 1915.

P. CATUCCI.  
 MANDREL FOR TALKING MACHINES.  
 APPLICATION FILED APR. 5, 1915

1,162,034.

Patented Nov. 30, 1915.



*Olin Catucci* INVENTOR.

BY  
*Louis M. Sanders* ATTORNEYS.

# UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

## MANDREL FOR TALKING-MACHINES.

1,162,034.

Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed April 5, 1915. Serial No. 19,142.

*To all whom it may concern:*

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Mandrels for Talking-Machines, of which the following is a specification.

In talking machines for the reproduction of disk records, it is found that when the stop or brake mechanism is applied to stop the rotation of the motor, the momentum of the governor is such as to cause the governor shaft to rotate several turns thereby producing a disagreeable "click" as the governor comes to a final and sudden stop. This overrunning of the governor shaft also produces an undue and unnecessary strain upon the driving parts. The introduction of the worm gear as a means for communicating motion from the driving mechanism to the governor shaft has resulted in a large measure as producing a silent motor; nevertheless, without some device such as that hereinafter described, the silent running of the motor is marred by the disagreeable "click" produced by the parts when the motor is suddenly stopped by applying a brake pressure to the tablet support.

The object of my invention is to introduce into the driving mechanism for the governor shaft, a yielding connection between the driving worm gear and the mandrel or driving shaft so that the overrunning of the governor shaft due to the momentum of the governor balls will be yieldingly retarded and gradually stopped rather than suddenly stopped as is the case with the present form of driving mechanism.

In carrying out my invention I make use of the structure substantially as illustrated in the accompanying drawings, wherein—

Figure 1, is a side elevation of my improved mandrel or driving shaft with the governor shaft and parts shown in dotted lines. Fig. 2, is a plan view of the mandrel and worm gear with the governor and its shaft and driving shaft shown in dotted lines.

Similar letters of reference refer to like parts throughout the specification and drawings.

I have not deemed it necessary to show the remaining parts of the motor, inasmuch as they may be of any usual or preferred type.

The mandrel, or tablet driving shaft 1, is substantially cylindrical throughout its length and provided at its lower end with a pivot 2, adjacent to which pinion teeth 3 are cut in the cylindrical body of the shaft. The upper end of the shaft 1 is tapered in the usual manner as at 4, to receive the tapered bearing thimble of a tablet support, or turntable. The driving worm wheel 5 is loosely mounted upon the shaft in position to engage the worm 6 upon the governor shaft 7. Located above the worm wheel 5, upon the shaft 1, is a collar 8, which may be rigidly secured to the shaft 1 by means of a set screw 9. Between the hub 5' of the wheel 5, and the collar 8, surrounding the shaft 1, is the coiled spring 10, the upper end 11, of which, is bent parallel to the axis of the shaft 1, and inserted into an aperture in the face of the collar 8; the opposite end of the spring 10 is similarly bent as at 12, and inserted into a corresponding aperture in the hub 5' of the worm wheel 5.

As a safety device I rigidly secure upon the shaft 1, a collar 13, located adjacent to the pinion 3, and provide said collar with the pin 14, lying parallel to the axis of the shaft 1, in position for engagement with a similar pin 15 projecting from the lower face of the worm wheel 5.

It is to be understood that the shaft 1 is rotated by means of a driving gear 16, which engages the pinion 3. The governor shaft 7 is rotated by the teeth of the worm wheel 5, meshing with the threads 6, upon the shaft 7, in the usual way.

In talking machine motors of the type to which my improvement relates, it is the practice to stop the motor by the application of a brake to the tablet support or turntable, which as above indicated is mounted upon the tapered end 4 of the shaft 1. When such a stop is applied the shaft 1 stops suddenly, but because of the "quickness" of the threads 6 upon the shaft 7, and the momentum of the governor balls, the shaft 7 continues to rotate until such time as the governor shaft shall have traveled in the direction of the arrow to bring the shoulder adjacent to its lower pivot, as shown in Fig. 2, against the bearing of said pivot. This is what produces the disagreeable "click" and also the sudden strain upon the parts of the governor. If not corrected in some way, the parts of the gov-



ernor very frequently work loose and cause trouble. But the introduction of the yielding spring 10, into this driving train, permits a resilient retardation of the rotation of the governor shaft, thereby gradually overcoming the momentum of the governor balls.

In connecting up the parts as shown in Fig. 1, I find it advisable to turn the collar 8 to such a position that it will cause the worm wheel 5 to assume a position with the stop pin 15, diametrically opposite the pin 14. This permits the governor shaft 7 to have a dozen or more turns before the pins 14 and 15 will contact; usually the governor shaft is completely checked before the pins 14 and 15 come into contact. These pins, however, serve the additional purpose of permitting the continuous use of the talking machine in case of breaking the spring 10, for it is readily seen that when the shaft 1 is rotated, even with the spring 10 broken, the pin 14 will revolve around until it contacts with the pin 15, after which the shaft 1 and the worm 5 will rotate together.

In practice I find that when the rotation of the shaft 1 is suddenly arrested, the momentum of the governor balls will cause the shaft to rotate, thereby winding up the spring 10 until such time as its tension completely overcomes the momentum of the governor balls, at which time the governor shaft 7 will oscillate back and forth until it completely comes to rest, but in no case is there any endwise movement of the governor shaft with a result that the disagreeable "click" is completely overcome.

I claim:

1. A mandrel for talking machines comprising a rotating shaft, a pair of collars spaced apart and rigidly secured to said shaft, a driving gear loosely mounted upon said shaft between said collars, a spring connecting one of said collars with said gear, a projection upon the other collar, and a mating projection upon said gear whereby in-

dependent rotation of said gear upon said shaft will cause said projections to contact.

2. A mandrel for talking machines comprising a rotating shaft, a collar rigidly secured to said shaft and provided with a projection thereon, a second collar mounted upon said shaft, a driving gear loosely mounted upon said shaft between said collars, a projection upon the face of said gear for engagement with the projection upon the first named collar, and a coiled spring surrounding said shaft and connecting said gear with said second named collar.

3. A mandrel for talking machines comprising a rotating shaft, a collar rigidly secured to said shaft and provided with a projection thereon, a second collar mounted upon said shaft, a driving gear loosely mounted upon said shaft between said collars, a projection upon the face of said gear for engagement with the projection upon the first named collar, a coiled spring surrounding said shaft and connecting said gear with said second named collar, and means for adjusting said second named collar upon said shaft to bring the projections respectively opposite each other.

4. A mandrel for talking machines comprising a shaft, a driving pinion upon one end of said shaft, a pair of collars spaced apart and rigidly secured to said shaft, a worm gear located between said collars and loosely mounted upon said shaft, a spring connection between one of said collars and said gear, and mating projections upon said gear and said other collar whereby upon the rupture of said spring connection said projections will engage and cause said gear to rotate with said shaft.

In testimony whereof I have hereunto set my hand this 3d day of April, 1915.

PLINY CATUCCI.

Witnesses:

L. M. SANDERS,  
LOUISE GREEN.

PHONOGRAPH,

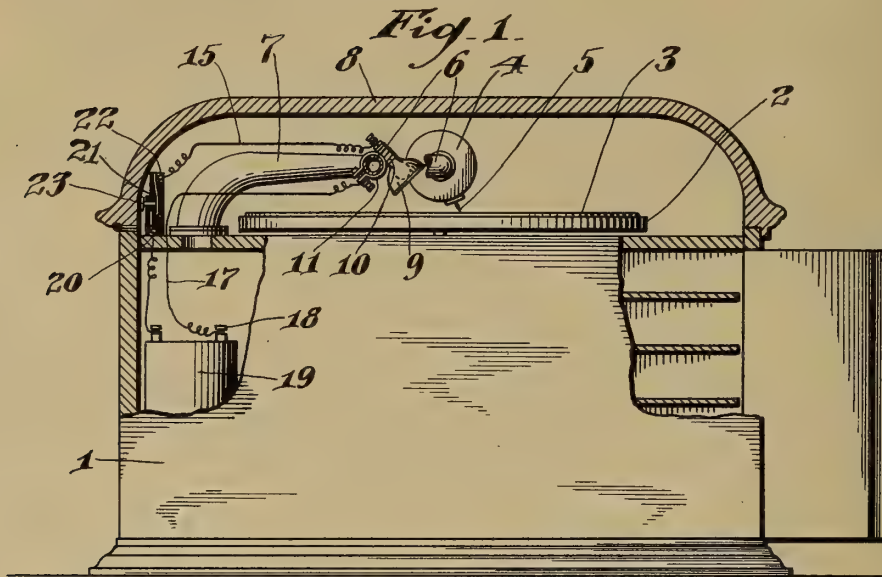
# 1,162,202-----C. Agner, Jr.,  
Patented-November 30, 1915.  
Filed-March 29, 1915.

C. AGNER, JR.  
PHONOGRAPH.

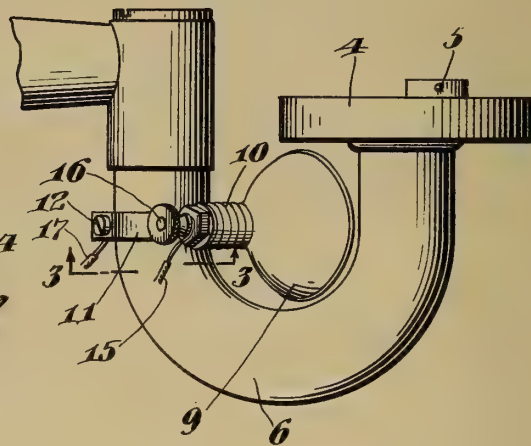
APPLICATION FILED MAR. 29, 1915.

1,162,202.

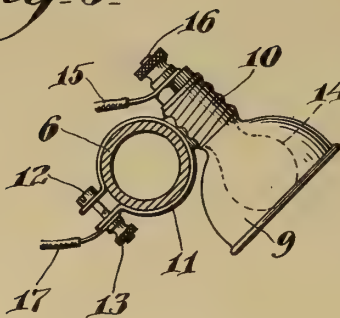
Patented Nov. 30, 1915.



*Fig. 2*



*Fig. 3*



Inventor

Charles Agner, Jr.

By Joshua R. H. Toth.

Attorney

Witnesses

Thos. Roseman.  
C. R. Ziegler.



# UNITED STATES PATENT OFFICE.

CHARLES AGNER, JR., OF PHILADELPHIA, PENNSYLVANIA.

## PHONOGRAPH.

1,162,202.

Specification of Letters Patent. **Patented Nov. 30, 1915.**

Application filed March 29, 1915. Serial No. 17,783.

*To all whom it may concern:*

Be it known that I, CHARLES AGNER, JR., a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to improvements in phonographs, and more particularly to an improved illuminating attachment designed for use on any ordinary construction of talking machine, and which is adapted to illuminate the record when the cover is open.

A further object is to provide an electric lamp removably connected to the goose neck of a talking machine, and connected in circuit with a battery or source of electricity including a pair of contacts which are separated by the closing of the cover of the phonograph, and which are permitted to come together to close the circuit when the cover is elevated, so that the disk is illuminated only at such time as the cover is elevated, so that there is no waste of electric current.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claim.

In the accompanying drawings: Figure 1 is a view partly in elevation and partly in section illustrating my improved attachment in connection with an ordinary type of talking machine. Fig. 2 is a top plan view illustrating my improved lamp in position on the goose neck of the talking machine, and Fig. 3 is a view in section on the line 3—3 of Fig. 2.

1 represents the casing of an ordinary talking machine having a turn table 2 supporting a record disk 3.

4 is the ordinary sound box having the needle 5 engaging the record disk, and said box connected by a goose neck 6 with the transmitting tube or horn 7.

8 is a hinged cover normally inclosing the turn table disk and coöperating parts. On the goose neck 2, I secure my improved electric lamp which constitutes a reflector 9 secured to a socket 10, and the latter having a split clamp 11 secured around the goose neck 6 by means of a bolt 12 and nut 13.

An ordinary incandescent globe 14 is lo-

cated in the reflector, and secured in the socket, and one wire 15 is secured to a binding post 16 at the end of the socket, while the other wire 17 is connected to the bolt 12. Wire 17 is directly connected to a pole 18 of a battery 19, while wire 15 is broken, and provided with contacts 20 and 21. These contacts are supported by a block 22, and a pin 23 carried by the cover 8 is adapted to separate the contacts when the cover is closed, but allow them to move together when the cover is opened.

The contacts 20 and 21 are preferably of spring metal, so that they move together when the cover is opened, while the pin 23 forces them apart whenever the cover is closed.

It will therefore be noted that when the cover of the talking machine is opened, the circuit will be closed, so that the disk 3 will be illuminated, and the operator can readily find the groove therein to position the needle 5, when the cover closes the circuit, so that there is no waste of electric current.

It will be noted that I have positioned the lamp at an incline, so that its rays of light are thrown directly down upon the record disk, and hence a very small lamp may be utilized to efficiently carry out the functions intended, and hence a small amount of current is needed for the work.

As the lamp is carried by the goose neck 6, it will be raised and lowered as the goose neck is moved, and will not interfere in any way with the ordinary operation of the machine.

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claim.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

The combination with a talking machine having a pivoted tone arm, a goose neck pivotally connected to the tone arm, and a sound box at the free end of the goose neck, of a clamp secured around the goose neck, a lamp socket secured to the clamp, said socket having a lamp in its forward end and a binding post on its rear end, a reflector on the socket around the lamp, a binding post on the

clamp, electric wires connected to the binding posts, and connected with a source of electricity and an electric switch controlling the circuit to the lamp, and a cover on the  
5 talking machine operating said switch, substantially as described.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

CHARLES AGNER, JR.

Witnesses:

MARIE JACKSON,  
CHAS. E. POTTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

APPARATUS FOR MAKING PHONOGRAPH RECORDS,  
# 1,162,256-----W. Retter,  
Patented-November 30, 1915.  
Filed-November 19, 1910.



W. ROTTER.  
 APPARATUS FOR MAKING PHONOGRAPH RECORDS.  
 APPLICATION FILED NOV. 19, 1910.

1,162,256.

Patented Nov. 30, 1915.  
 4 SHEETS—SHEET 1.

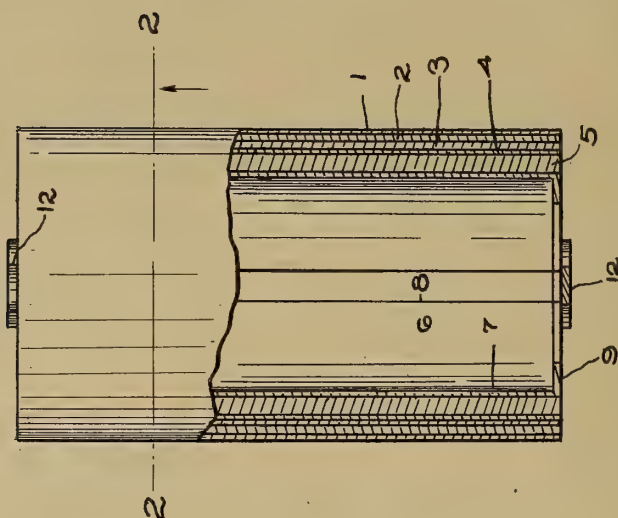


Fig. 1.

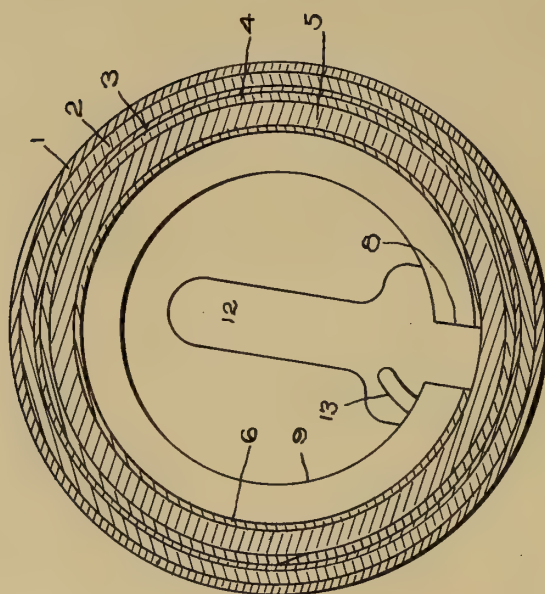


Fig. 2.

WITNESSES  
*Cornelius Zabiskie*  
*Frances E. Blodgett*

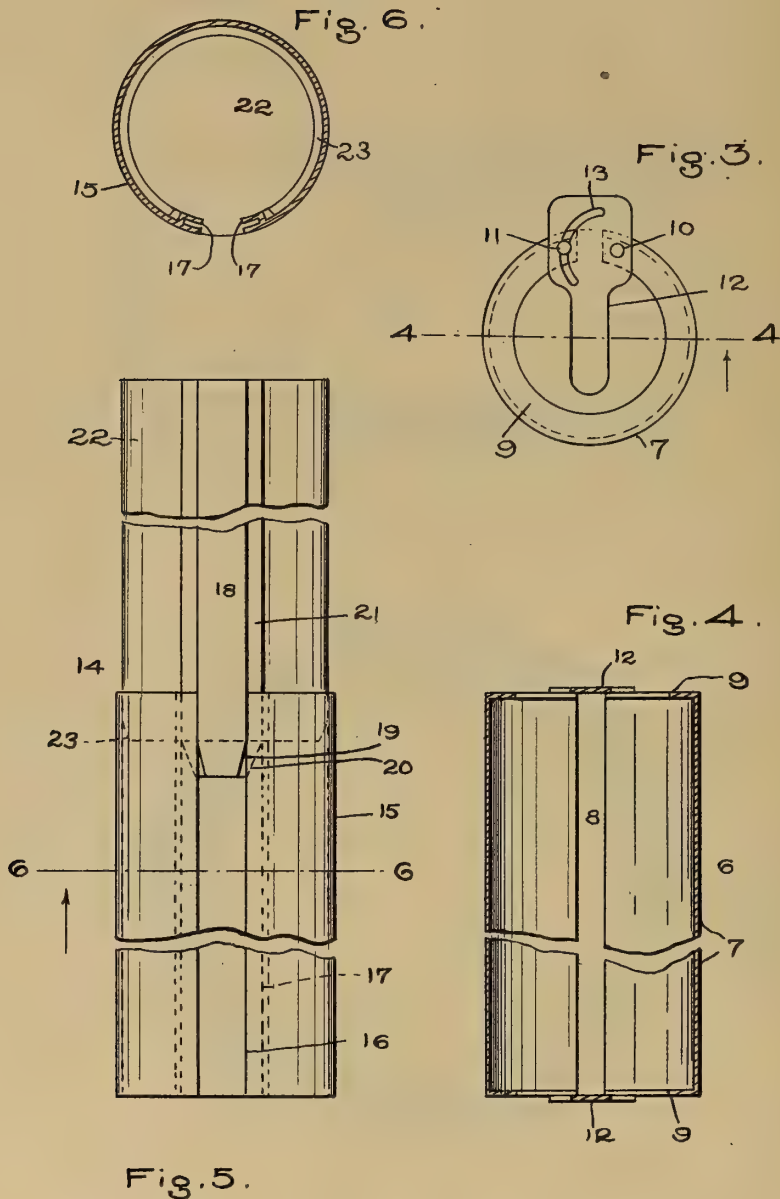
INVENTOR  
*William Rotter,*  
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W. ROTTER.  
 APPARATUS FOR MAKING PHONOGRAPH RECORDS.  
 APPLICATION FILED NOV. 19, 1910.

1,162,256.

Patented Nov. 30, 1915.  
 4 SHEETS—SHEET 2.



WITNESSES  
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 Frances W. Blodgett.

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 APPARATUS FOR MAKING PHONOGRAPH RECORDS.  
 APPLICATION FILED NOV. 19, 1910.

1,162,256.

Patented Nov. 30, 1915.

4 SHEETS—SHEET 3.

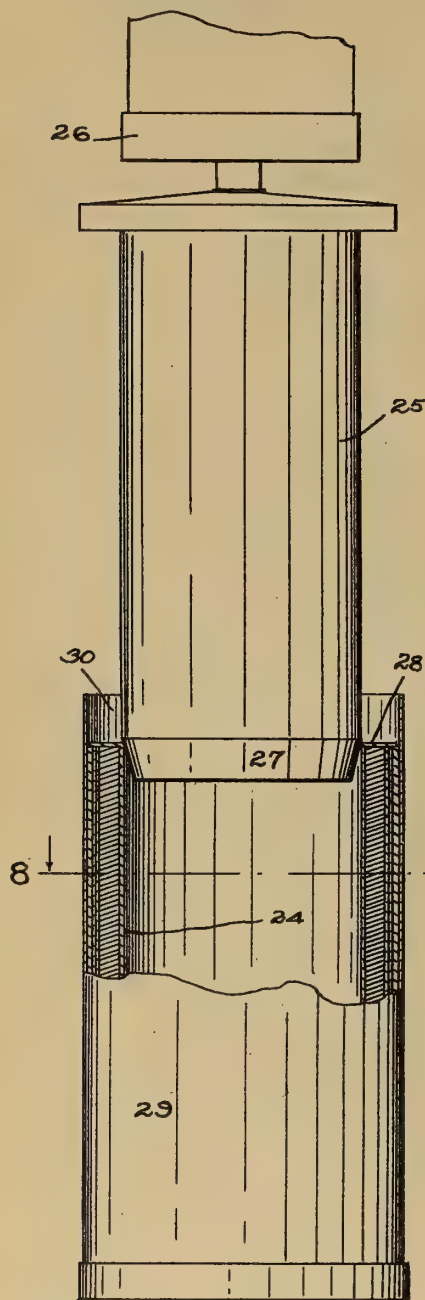


Fig. 7.

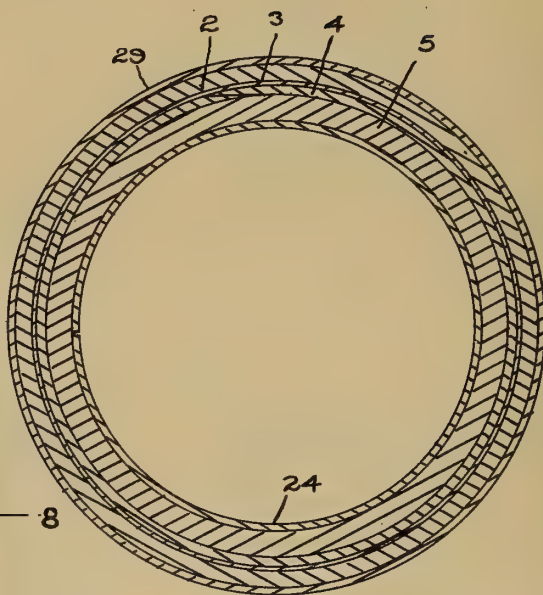


Fig. 8.

WITNESSES

*Cornelius Gabriskie*  
*Frances E. Blodgett*

INVENTOR

*William Rotter,*  
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*Russell M. Everett,*  
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W. ROTTER.  
 APPARATUS FOR MAKING PHONOGRAPH RECORDS.  
 APPLICATION FILED NOV. 19, 1910.

1,162,256.

Patented Nov. 30, 1915.  
 4 SHEETS—SHEET 4.

Fig. 11.

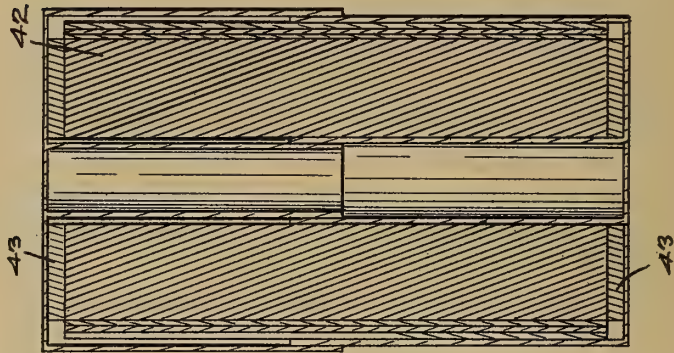


Fig. 9.

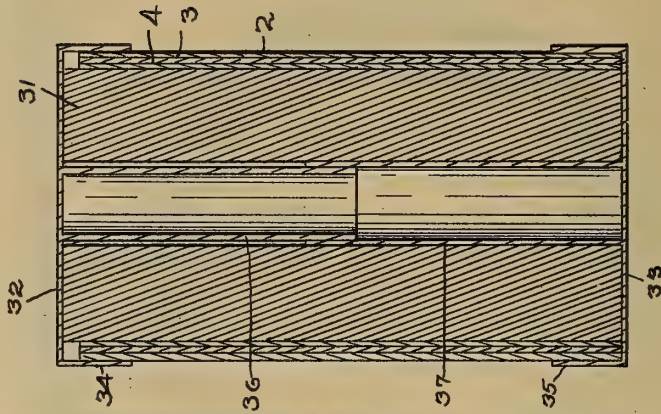
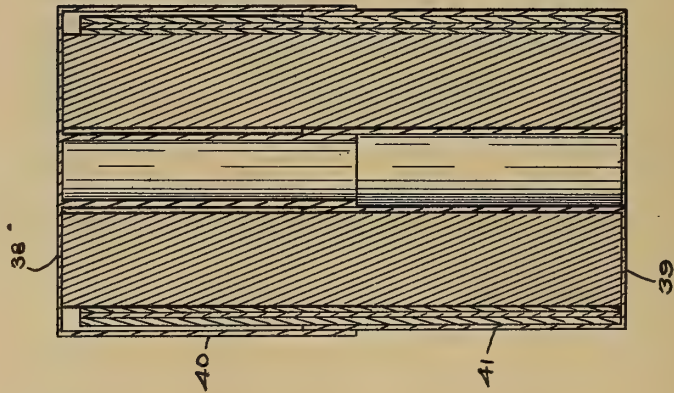


Fig. 10.



WITNESSES  
*Cornelius Gabriels*  
*Frances W. Blodgett*

INVENTOR  
*William Rotter*,  
 BY  
*Russell M. Everett*,  
 ATTORNEY.

# UNITED STATES PATENT OFFICE.

WILLIAM ROTTER, OF NEWARK, NEW JERSEY.

APPARATUS FOR MAKING PHONOGRAPH-RECORDS.

1,162,256.

Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed November 19, 1910. Serial No. 593,146.

*To all whom it may concern:*

Be it known that I, WILLIAM ROTTER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain Improvements in Apparatus for Making Phonograph-Records, of which the following is a specification.

The objects of this invention are to secure an improved method of manufacturing cylindrical records of plastic materials that can be softened by heat, such as celluloid and the like; to enable the requisite pressure of the cylinder against the matrix to be obtained directly and uniformly; to secure sharply defined impressions in the record and thus a clear and perfect sound reproduction; to reduce the cost and labor of manufacturing records, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several figures, Figure 1 is a side elevation of the preferred form of apparatus for carrying out my improved process, partly in central vertical section; Fig. 2 is a cross section on line 2—2 of Fig. 1, looking in the direction indicated by the arrow; Fig. 3 is an end view of the pressure producing means detached from the rest of the apparatus; Fig. 4 is a central longitudinal section of said pressure producing means, taken on line 4—4 of Fig. 3, looking in the direction indicated by the arrow; Fig. 5 is a side elevation of another form of pressure-producing means which can be employed in place of that shown in Figs. 1, 2, 3 and 4; Fig. 6 is a cross section on line 6—6 of Fig. 5, looking in the direction indicated by the arrow; Fig. 7 is a side elevation of an apparatus having modified means for producing the pressure; Fig. 8 is a cross-section on line 8—8 of Fig. 7, looking in the direction indicated by the arrow; Fig. 9 shows in central longitudinal section an apparatus having means for expanding the rubber sleeve radially by compressing it longitudinally, the compressing caps overlapping the ends of the matrix only a short distance; Fig. 10 illustrates a modification in which the end caps telescopically overlap each other at the outside of the

matrix so as to form a casing, and Fig. 11 illustrates a form in which compressing rings are placed between the end caps and ends of the rubber sleeve.

In said drawings, and referring especially to Figs. 1, 2, 3 and 4, 1 indicates a cylindrical casing open at both ends and adapted to contain the cylindrical matrix 2 fitting said casing so as to be supported thereby. The matrix 2 has on its inner surface the impressions to be produced on the record, and 3 indicates a cylinder of celluloid adapted to fit in said matrix and be pressed against the inner surface thereof. Inside the said celluloid cylinder 3 is a layer 4 of paper, and next inside said paper is a rubber sleeve 5. Inside said sleeve is an expander 6 by means of which the said rubber sleeve 5 is expanded radially outward in all directions to secure the requisite pressure of the celluloid cylinder against the matrix. The said expander 6 comprises a tubular sheet metal body portion 7 split longitudinally as at 8 and having inturned end flanges 9, 9. Upon each end of said tubular body portion 7 are means for forcing apart the edges of the same on opposite sides of its longitudinal slit 8, so as to obtain outward pressure. These means are the same for both ends of the device and comprise two studs 10, 11 set in the end flanges 9 on opposite sides of the slit 8, a hand lever 12 being pivoted upon one stud, as 10, and having in itself a slot 13 to receive the other stud 11. Said slot 13 is eccentric with respect to the pivotal stud 10, so that as the lever is swung in one direction it contracts the expander and when swung in the other direction expands it. In the drawings I have shown the handle of the lever 12 projecting radially inward over the end of the expander, but obviously it could extend in the opposite direction if desired. The two levers 12, 12 can be operated together and thus the tubular body portion 7 expanded to press the rubber sleeve 5 against the celluloid cylinder 3 to force it against the matrix. It will of course be understood that in connection with such pressure the matrix and celluloid cylinder are suitably heated to soften the latter.

In Figs. 5 and 6 of the drawings I have shown an expander 14 which can be used in



place of the expander 6 just described, if desired. In this construction a tubular sheet metal body portion 15 is longitudinally slotted as at 16 and provided at the opposite edges of said slot with grooves 17, 17. After the body portion 15 has been inserted in a rubber sleeve, a wedge 18 is driven or forced into the longitudinal slot 16 of said tubular body portion, said wedge being tapered at one end for starting, as at 19, 20, and having suitable tongues 21 at its lateral longitudinal edges to enter the grooves 17, 17. Preferably there is attached to the said wedge a cylindrical filler 22 to occupy the inside of the tubular body portion 15, and positively retain the shape of the same. This filler 21 is somewhat shorter than the wedge 18, so as to give the latter time to expand the body portion before the filler reaches it, and furthermore said filler is tapered as at 23 to more readily enter the body portion. This wedge and filler are forced into the expander body portion by any suitable means, and when in place cause said body portion to expand uniformly to secure the desired pressure.

In Figs. 7 and 8 I have shown an expander consisting of a simple split tube 24 adapted to be placed inside the rubber sleeve, and a plunger 25 adapted to be forced into said split tube, as by a hydraulic press 26. Said plunger is tapered at its end 27 to start into the tube 24 and the outside diameter of said plunger is such as will secure the desired amount of expansion. Preferably the upper end of the expanding tube 24 has a flange 28 adapted to overlap the rubber sleeve 5, paper layer 4, celluloid cylinder 3, and matrix 2, so as to protect the upper ends of said parts. The lower ends of said parts, as well as the lower end of the expanding tube, rest upon the closed bottom of the casing 29, and the side walls of said casing preferably extend above said parts which the casing incloses, as at 30.

In Fig. 9 I have shown a thicker rubber sleeve 31 arranged inside of the paper layer 4, celluloid cylinder 3 and matrix 2, said sleeve 31 being somewhat longer than the said parts. Caps 32, 33 fit over the ends of said rubber sleeve, the flanges 34, 35 of said caps overlapping outside the matrix. Said caps furthermore have central tubular stems 36, 37 which are adapted to extend into the longitudinal chamber of the rubber sleeve 31 and telescope each other to guide the caps as they are pressed together.

Obviously when the caps 32, 33 are forced together the rubber sleeve 31 will be expanded to secure the desired outward pressure, and said caps may be forced together by any appropriate means whatever, such as a press.

In Fig. 10 end caps 38, 39 are provided having flanges 40, 41 which are long enough to overlap and telescope each other. Said

flanges thus cover the sides of the matrix, and the end caps constitute a casing which incloses all the parts.

In Fig. 11 I have shown a modified form of apparatus in which the rubber sleeve 42 is of substantially the same length as the matrix and celluloid cylinder, washers 43, 43 being inserted between the ends of the rubber sleeve and the end caps. Said end caps therefore do not engage the rubber sleeve directly, but when forced together said rubber sleeve is expanded to produce the same radially outward pressure as is obtained by the constructions shown in Figs. 9 and 10.

It will be understood that any other substance which is sufficiently elastic to make it substantially equivalent to rubber can be employed for the sleeve which I have termed the "rubber sleeve", and I do not wish to be limited in such details except as the state of the art may require.

Having thus described the invention, what I claim is:

1. In an apparatus for making phonograph records, the combination with a tubular matrix adapted to receive within itself a hollow cylindrical record blank, of a sleeve of resilient material inside said matrix, a split tubular member inside said sleeve, and means arranged transversely of said split tubular member upon the ends thereof for expanding the split tubular member, said means being longitudinally of said split tubular member located outside the bore or passage thereof.

2. In an apparatus for making phonograph records, the combination with a tubular matrix adapted to receive within itself a hollow cylindrical record blank, of a sleeve of resilient material inside said matrix, a split tubular member inside said sleeve having end flanges bent radially inward, and means upon said end flanges outside the bore or passage of the tubular member for expanding the same.

3. In an apparatus for making phonograph records, the combination with a tubular matrix adapted to receive within itself a hollow cylindrical record blank, of a sleeve of resilient material inside said matrix, a split tubular member inside said sleeve, and levers one at each end of said split tubular member fulcrumed upon one of the margins thereof and engaging the margin upon the opposite side of the split to force said margins apart.

4. In an apparatus for making phonograph records, the combination with a tubular matrix adapted to receive within itself a hollow cylindrical record blank, of a sleeve of resilient material inside said matrix, a split tubular member inside said sleeve having end flanges bent radially inward, and levers on said end flanges outside the bore



or passage of the tubular member for expanding the same.

5 In an apparatus for making phonograph records, the combination with a tubular matrix adapted to receive within itself a hollow cylindrical record blank, of a sleeve of resilient material inside said matrix, a split tubular member inside said sleeve, studs

at each end of said split member at opposite sides of the split, and levers one pivoted on one stud of a pair and having an eccentric groove receiving the other stud. 10

WILLIAM ROTTER.

In the presence of—

RUSSELL M. EVERETT,

FRANCES E. BLODGETT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



PHONOGRAPH PATENT.

COATED PHONOGRAPH STYLUS AND OTHER  
ARTICLE,

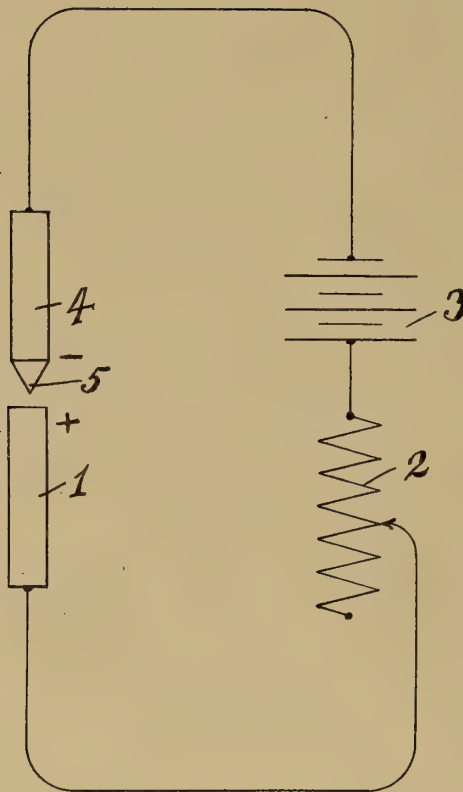
# 1,162,285-----E. A. Eckhardt,  
Patented-Nov. 30, 1915.  
Filed-Feb. 25, 1915.



E. A. ECKHARDT.  
COATED PHONOGRAPH STYLUS AND OTHER ARTICLE.  
APPLICATION FILED FEB. 25, 1915.

1,162,285.

Patented Nov. 30, 1915.



Witnesses  
*Nellie Field*  
*Harry S. Marsh*

Inventor  
*Engelhardt A. Eckhardt*  
by *Caroline L. Eber*  
his Attorney

# UNITED STATES PATENT OFFICE.

ENGELHARDT A. ECKHARDT, OF PHILADELPHIA, PENNSYLVANIA.

## COATED PHONOGRAPH-STYLUS AND OTHER ARTICLE.

1,162,285.

Specification of Letters Patent.

Patented Nov. 30, 1915.

Continuation of application Serial No. 867,955, filed October 22, 1914. This application filed February 25, 1915. Serial No. 10,585.

*To all whom it may concern:*

Be it known that I, ENGELHARDT A. ECKHARDT, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented new and useful Coated Phonograph-Styli and other Articles, of which the following is a specification.

My invention resides in articles of iron, steel or other metal, or combination of metal or alloy having a coating of metal, or combination of metals, or alloy, alloyed therewith, for the purpose of making the point, edge, surface or the whole mass of such articles hard, hard and abrasive, wear withstanding, or having other desirable properties.

More particularly my invention relates to such an article having such a coating of tungsten, chromium, cobalt, molybdenum, etc., or an alloy of any of these with another metal, or an alloy of one of these with one or more of the others mentioned.

My invention resides in a stylus or needle for use in making phonographic sound records, or for reproducing sounds from sound records. Such a stylus consists preferably of a metallic stylus or needle having at its point and vicinity thereof a coating of tungsten, or tungsten alloyed with the metal of a needle or stylus. Such a stylus or needle is very hard, harder than tungsten itself, and successfully withstands wear and lasts many times longer than the ordinary stylus which, as well known, serves for reproducing from a relatively small amount of sound record and must then be replaced by a new needle. A stylus or needle of the character herein described I have found will serve to reproduce from a very great number of average sized records without any substantial wear. And such a stylus or needle is inexpensive because of the very small amount of tungsten or tungsten alloy or other metal required and from the further fact that the process of making the same is simple and inexpensive.

My invention resides also in the process of making the articles described.

The accompanying drawing illustrates a mode of carrying out my invention.

In the drawing, 4 represents a phonograph stylus or needle having the pointed end 5. It is shown connected by a conductor with the negative terminal of the source of cur-

rent 3, preferably a source of direct current, as a storage battery or dynamo-electric generator whose positive terminal is connected through the adjustable resistance 2 with the positive electrode 1 of tungsten, tungsten alloy, or other suitable material, as molybdenum, cobalt, chromium, etc., or an alloy of any one of these, or an alloy of any one of them with any other or others of them.

The operator touches the point 5 of the stylus 4 to the electrode 1 and upon withdrawing it slightly from the member 1 an arc will be struck between the point 5 of the stylus and the electrode 1. During the existence of this arc vapor of the metal 1 will be transmitted through the arc and be deposited upon the point 5 where the tungsten, tungsten alloy or other material referred to forms a coating upon the point 5. This coating consists of an alloy of the tungsten or other deposited metal with the metal of the stylus, which is generally of iron or steel. During the manipulation the stylus may be turned in suitable directions to cause the arc to strike all those parts of the surface which it is desired shall be coated.

Little if any experience is required to direct the arc on to any part of the surface, so that the operator may at will cause the alloy or coat to form on any desired areas or points.

In case such metals are used as will readily oxidize in the practice of the process, the operation may be carried out in an atmosphere of neutral gas, as hydrogen, nitrogen, etc.

The result of the above described treatment is a stylus or needle, or any other article, which will have a coating which gives to the article desirable qualities and characteristics. In the case of an iron or steel phonograph stylus there will be formed a tungsten or other alloy of iron or steel at the point of the stylus, giving it great wear-withstanding properties, such an alloy being very hard indeed. And with styli or phonograph needles which I have so treated the hardness is such that it resists the action of any good file, though it will be understood that my invention is not limited to such degree of hardness. And with a stylus so treated I have found it is useful in reproducing sounds from sound records to be very many times longer than the life of the ordinary untreated stylus.



Where the coating process has caused undesired irregularity or deformation of the point, the same may be ground to suitable sharpness or shape after the coating process, and after grinding the point may be polished so that, while having great hardness and wear-withstanding properties itself, it will not seriously abrade the sound record. Or a stylus may be made by first treating the end of a rod or wire of suitable dimensions by my process, and thereafter grinding or otherwise forming it to desired shape.

Besides phonograph styli other previously shaped articles may be similarly treated to provide a hard wear-withstanding point, edge or surface. For example, the points of pens may be so treated, in which case the pen replaces the stylus in the electric circuit. Or in place of the stylus in the electric circuit may be placed a drill, or a chisel, and by practising the process the cutting edge of the drill or the chisel may consist of such a hard wear-withstanding alloy or coat. Or the tube and stylus of stylographic pens may be so treated to render them wear-withstanding and non-corroding.

While tungsten steel is well known and is known to have great hardness, it is a material which is very difficult to operate upon or work and it would be a relatively expensive stylus, chisel, pen, drill, or other article which would be made in its entirety or largely of tungsten steel. By my process, however, the article may be made of ordinary steel commonly used for such articles, and then locally treated with a coat of tungsten or alloy to give it the desired hardness, wearing or other qualities.

It will be understood that for the electrode 1 may be substituted an electrode of carbon, in which case the tungsten or other material to be applied to the article may be thrust into the arc between the two electrodes and there be vaporized and carried by the arc to the article to be treated.

Where the article to be treated is of iron the electrode 1 may be of carbon and with the result that carbon is transferred to the iron which may be converted locally or on its surface to steel. And this steel may then be alloyed with tungsten or other suitable material transmitted through the arc after the carbon treatment, or simultaneously by inserting in the arc between the carbon and iron electrodes the tungsten or other material. And it will be understood that in

the case of a phonograph stylus as well as the other articles referred to, when of steel, that they may be tempered before the coating or alloying process; or they may be tempered after such process.

In the appended claims the term "iron" is generic and includes "steel" as a specific form of iron.

This application is a continuation of my co-pending application Serial Number 867,955, filed October 22, 1914.

What I claim is:

1. An article having a body of iron having a hard wear-withstanding coat consisting of a refractory metal alloyed on the iron body.
2. An article having a steel body having a hard wear-withstanding coat comprising tungsten alloyed on the steel body.
3. A phonograph stylus having a metallic body having a hard wear-withstanding coat of iron and tungsten alloy.
4. A phonograph stylus having a body portion and a hard wear-withstanding point consisting of a coat of an alloy of a refractory metal which can be tempered.
5. A phonograph stylus having at or near its point a hard coating formed of refractory metal alloyed with the stylus material.
6. A metallic article having a hard wear-withstanding alloy coating formed by a refractory metal combined with the metal of the article.
7. A phonograph stylus having a polished point having a coating of refractory material alloyed with the stylus material.
8. An article having a body of steel having a hard wear-withstanding coat consisting of a refractory metal alloyed on the steel body.
9. An article having an iron body having a local admixture of carbon, and a coat comprising a refractory metal alloyed with said iron containing carbon.
10. An iron article having a hard alloy coating formed by a refractory metal combined with the metal of the article.
11. A steel article having a hard, wear-withstanding alloy coating of steel and tungsten.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

ENGELHARDT A. ECKHARDT.

Witnesses:

NELLIE FIELD,  
ALICE S. MARSH.



GRAPHOPHONE PATENT.

SOUND BOX,

# 1,162,351-----W. F. Grupe,  
Patented-November 30, 1915.  
Filed-April 21, 1915.

**1,162,351.**

Fig. 1

Fig. 2

S. M. Baader  
H. G. Leard

William F. Grupe Inventor

By his Attorneys  
Mastick & Lucke

# UNITED STATES PATENT OFFICE.

WILLIAM F. GRUPE, OF JERSEY CITY, NEW JERSEY.

## SOUND-BOX.

1,162,351.

Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed April 21, 1915. Serial No. 22,749.

*To all whom it may concern:*

Be it known that I, WILLIAM F. GRUPE, a citizen of the United States, and residing at Jersey City, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to sound boxes for phonographs, graphophones and like devices.

More specifically this invention is directed to the object of attaining a sound box and stylus lever construction for securing improved reproduction of the sounds impressed on the record and for making a record from original sounds.

Another object of the invention is to secure the desired rigidity and improved resiliency of the stylus lever and suspension means by novel means which can be constructed and assembled by workmen of limited ability and at a materially reduced cost.

Another object of this invention is to insure substantial uniformity in the performance of sound boxes especially when manufactured in large quantities in accordance with this invention. This and other objects are attained by the provision of one or more recesses of predetermined depths within the casing of the sound box, flexible pins or other suitable members of certain lengths extending from the stylus lever into said recesses and a clamping plate for retaining such pins or other members within said recesses to the desired depth thereof. Preferably, such recess or recesses are open along longitudinal sides thereof and a stop plate is provided to limit the extent of depth of such pin or pins, or other members, within said recesses and also to brace the clamping plate.

Further features and objects of my invention will be more fully understood from the following description and the accompanying drawings, in which—

Figure 1 is a front side elevation of an embodiment of my invention; Fig. 2 is an end elevation of Fig. 1; and Fig. 3 is a detail front elevation of the abutment portion of the sound box casing.

Referring to the drawings, the casing 1 of the sound box is of any approved construction and suitably supports the diaphragm 2 therein. The tone arm 3 is connected to the back of the sound box 1 by any approved connection.

The particular embodiment shown in the drawings comprises a downwardly extending portion 4, serving as an abutment, and provided with two recesses 5, 6, illustrated as semi-circular in formation and extending predetermined distances toward the rear of the casing 1. Such recesses 5, 6 are constructed to respectively receive the pins 7, 8, shown as substantially circular in cross section, extending from or carried by the stylus lever 9. The stylus lever 9 is preferably constructed to have an upper reduced end portion 10 at which it is secured to the diaphragm 2, an enlarged and greatly widened portion 11, and a lower somewhat narrower relatively heavy end portion 12, provided with an opening to receive a stylus or needle and a set screw 13 for securing the same therein. The pins 7, 8 are preferably disposed in a plane substantially at right angles to the direction of length to the stylus lever and at substantially equal distances relatively to the plane passing through the center of the stylus lever in the direction of length of the same. The pins 7, 8 may be integral with the enlarged portion 11 or may be brazed within openings within said enlarged portion 11. The pins 7, 8 are made of preferably highly resilient material, such as tempered steel, tempered steel alloys, etc. The pins 7, 8 are secured within their respective openings 5, 6 by means of the clamping plate 14 and one or more screws 15. Preferably, the rearwardly disposed stop plate is provided to limit the position of the rear ends of the pins 7, 8. Such stop plate 16 also serves to brace the clamping plate 14.

The parts of the sound box are assembled by placing the pins 7, 8 within the respective recesses 5, 6, then tightening the clamping plate 14 by means of the one or more screws 15 and finally securing the connection of the reduced end portion 10 with the diaphragm 2, the last named connection being performed in any approved manner. Normally, in the preferred forms of my construction, the pins 7, 8 extend in directions substantially at right angles to the plane of rest of the diaphragm 2. It is desirable to construct the enlarged portion 11 to normally extend to the rear of the front face of the casing and to closely approach the front face of the downwardly extending portion 4 of the casing 1.

It will be noted, in the embodiment illus-



trated in the drawings, that the clamping plate 14 engages the portions of the substantially circular pins 7, 8, which project through the open longitudinal sides of the substantially semi-circular recesses 5, 6, whereby the end 10 of the stylus lever 9 is readily adjusted relatively to the diaphragm 2.

It will be noted that the improved abutment set forth herein is also applicable for a single pin or other suitable flexible member connecting the stylus lever with the casing; however, greater stability and rigidity is secured by providing two or more pins or other suitable flexible members for resiliently connecting the stylus lever with the casing. Such advantages obtain during the operation of the device as well as during the assembling or shipment of the device. If an odd number of pins or other resilient members are employed, it is desirable to position a pin or its equivalent approximately at the center of the enlarged portion 11 and position the remaining pins or their equivalents symmetrically with respect to the longitudinal principal axis of the stylus lever.

Whereas I have illustrated and described my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from my invention.

What I claim and desire to secure by Letters Patent is:

1. The combination with a sound box provided with a substantially semi-circular recess of predetermined depth and open along a longitudinal side, of a stylus lever, a substantially circular flexible member extending from said stylus lever into said recess and projecting through said open longitudinal side and means engaging said

flexible member projecting through said open side for clamping said flexible member in said recess.

2. The combination with a sound box having a casing, a diaphragm carried by said casing, a stylus lever, an abutment in fixed relation to said casing and provided with a plurality of spaced substantially semi-circular recesses, said recesses being open along corresponding sides, flexible members secured to said stylus lever and having substantially circular portions respectively extending into said recesses and projecting through said open sides, a clamping plate adapted to engage said projecting portions of the flexible members and threaded members for holding said clamping plate to said abutment.

3. The combination of a sound box having an abutment provided with a plurality of substantially semi-circular recesses of predetermined depths, said recesses being open on the same sides, a stylus lever, a plurality of substantially circular flexible members extending from said stylus lever into said recesses and projecting through said open sides, means positively limiting the extent of insertion of said members within said recesses and means adapted to engage said flexible members along the portions thereof projecting through said open sides and also adapted to engage said limiting means.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM F. GRUPE.

Witnesses:

K. G. LEARD,  
S. M. BAEDER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

COMBINED PHONOGRAPHIC AND MOTION PICTURE APPARATUS  
FOR PRODUCING INDEXED SYNCHRONOUS RECORDS,  
# 1,162,433-----E. H. Amet,  
Patented-November 30, 1915.  
Filed-December 27, 1912.

E. H. AMET.

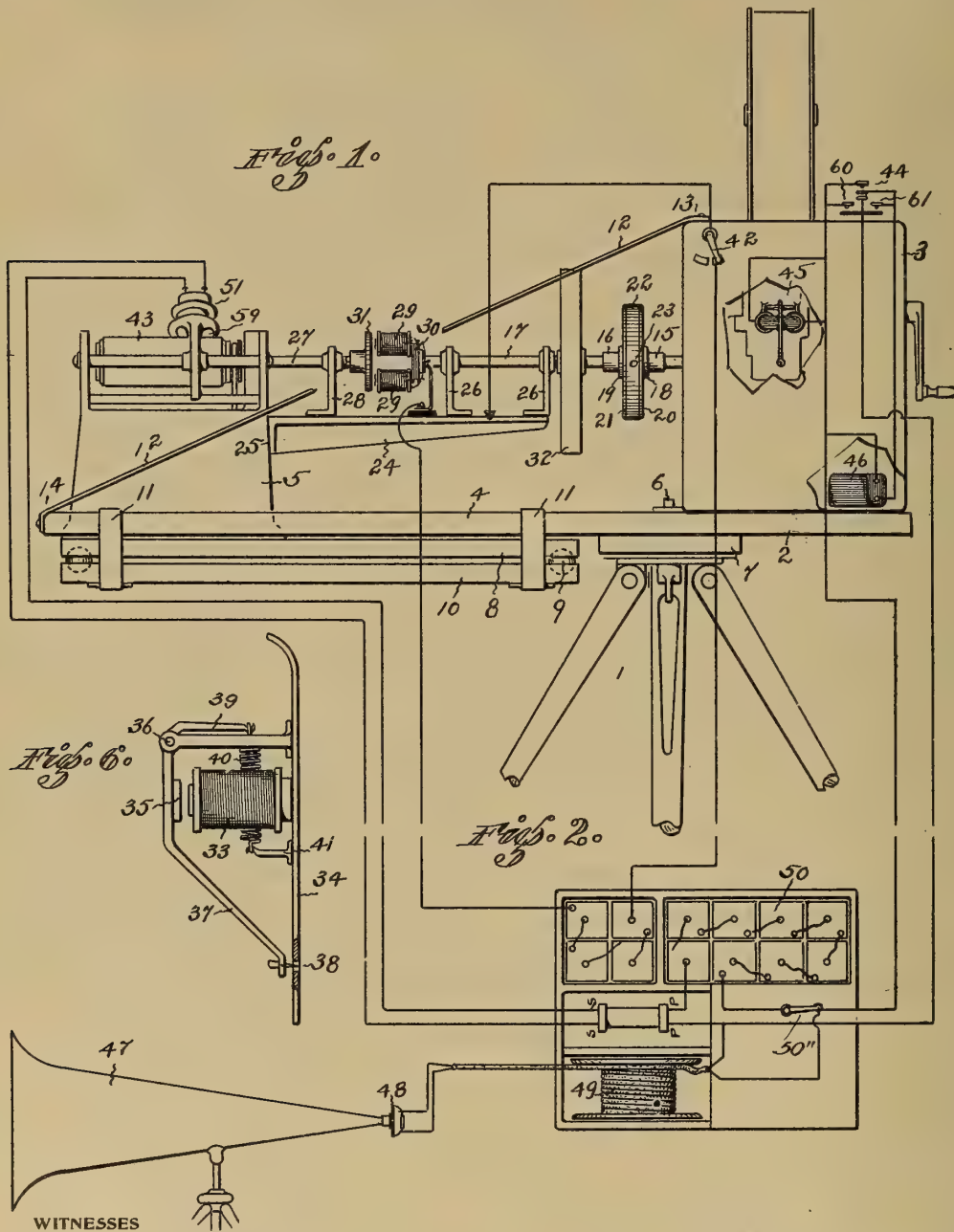
COMBINED PHONOGRAPHIC AND MOTION PICTURE APPARATUS FOR PRODUCING INDEXED  
SYNCHRONOUS RECORDS.

APPLICATION FILED DEC. 27, 1912.

1,162,433.

Patented Nov. 30, 1915.

2 SHEETS—SHEET 1.



WITNESSES

*Baldwin Vahr*  
*J. B. Gardner*

INVENTOR

*Edward H. Amet.*  
BY  
*Miller White.*  
ATTORNEY S.





E. H. AMET.

COMBINED PHONOGRAPHIC AND MOTION PICTURE APPARATUS FOR PRODUCING INDEXED  
SYNCHRONOUS RECORDS.

APPLICATION FILED DEC. 27, 1912.

1,162,433.

Patented Nov. 30, 1915.

2 SHEETS—SHEET 2.

Fig. 3.

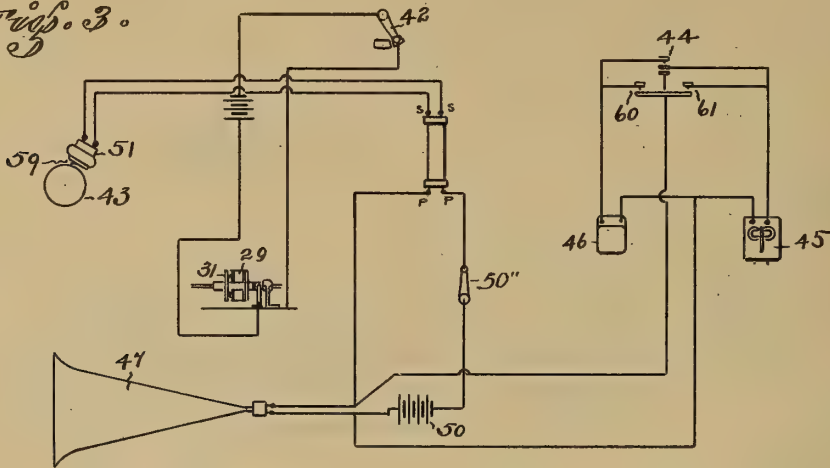


Fig. 7.

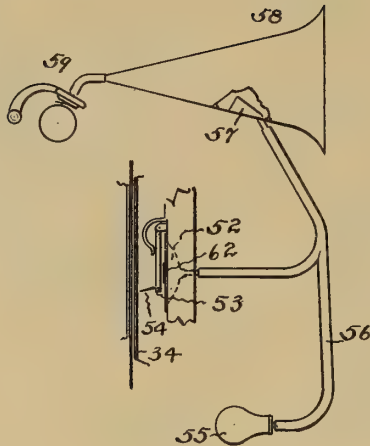


Fig. 4.

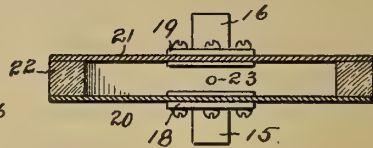
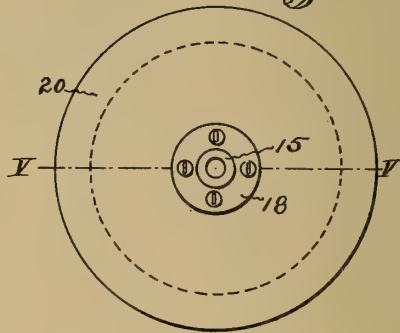


Fig. 5.

WITNESSES

Baldwin Vahr  
J. B. Gardner

INVENTOR

Edward H. Amet  
BY  
Miller White  
ATTORNEYS.

# UNITED STATES PATENT OFFICE.

EDWARD H. AMET, OF REDONDO BEACH, CALIFORNIA.

COMBINED PHONOGRAPHIC AND MOTION-PICTURE APPARATUS FOR PRODUCING INDEXED SYNCHRONOUS RECORDS.

1,162,433.

Specification of Letters Patent.

Patented Nov. 30, 1915.

Application filed December 27, 1912. Serial No. 738,809.

*To all whom it may concern:*

Be it known that I, EDWARD H. AMET, a citizen of the United States, and a resident of Redondo Beach, in the county of Los Angeles, State of California, have invented a new and useful Combined Phonographic and Motion-Picture Apparatus for Producing Indexed Synchronous Records, of which the following is a specification.

This invention relates to the art of reproducing action in both audible and visual expressions and is applicable with apparatus of the character set forth and claimed in Letters Patent of the United States No. 1,065,576, granted to me June 24, 1913, for combination apparatus for synchronizing motion and sound reproductions, and in my co-pending application for combined phonographic and motion picture machine filed April 21, 1913, Serial No. 762,553.

An object of this invention is to provide means whereby the sound and visual action recorded by means of my said combined phonographic motion picture machine can be reproduced by means of my said combination apparatus for synchronizing motion and sound reproductions. In order to attain this object it is necessary to so mark the record devices for the records of the sound and visual action, that they can invariably be made to bring the dual records into register for synchronous reproduction in my said patented reproducing apparatus wherein the picture record device controls the operation of the sound record device by operating means located in certain relation to the visual record.

An object of this invention is to provide means whereby the dual record devices may be provided with index markings having corresponding relation to their respective records so that the synchronously produced sound and visual records may be invariably brought into register in the reproducing apparatus and so that when said operating means of the visual record device comes into operation to start the sound record device into operation, the dual records will be in such position that the synchronous parts of the action will be synchronously reproduced throughout the subsequent simultaneous operation of the dual record devices.

By means of the apparatus shown in the said co-pending application a fixed ratio of

motion between the photographic and phonographic recording devices is established and maintained and it therefore becomes necessary to establish indexes which mark the two records simultaneously with exactness at the points of beginning. Where the picture device controls the time of starting the sound record device, it is absolutely necessary that said records be started with the places of beginning exactly coincident, otherwise the reproduction of the two records will conflict and will distress the senses of a listening observer. To avoid such conflict is a very difficult problem, and in attempting to arrive at a solution of such problem it is necessary that attention be given to the fact that marks for indexing the incipient points of picture and sound records simultaneously produced may be either arbitrarily established with some degree of coincidence or can be accurately established by the method herein shown.

An object of the invention is to accurately establish the same so that the dual reproduction will be in perfect synchronism.

I am aware that over a decade ago it was proposed that a signal such as the ringing of a bell or blowing of a whistle might be given some seconds before the commencement of a piece to mark a sound recording device, it being suggested that in reproducing the piece a picture reproducing device might be started at the exact moment for synchronous reproduction; but it is well known that up to the present time the synchronous reproduction of the sound and scene of a piece has not been accomplished in a popular manner. I apprehend that this is because of the impossibility of securing a practical synchronism by any of the proposed means, the hand of an operator being so much slower than the sight, thus preventing even a skilled operator from making a success. Furthermore the visible action of a sounding whistle or a ringing bell is seldom if ever synchronous with the sound of such bell or whistle and to secure a satisfactory synchronism of the sound and sight part of a reproduced piece such as a play or opera has never yet been accomplished to the satisfaction of a public audience. I have overcome this difficulty by the very simple invention herein amplified and described and which consists essentially in



providing, in combination with a combined phonographic and motion picture machine having means for producing photographic and auditory records in unison, means for marking the photographic record, means for marking the auditory record, and means for simultaneously operating said record means, so that while the two record devices are in operation both may be marked at the same instant and then by continuing to operate the two record-making machines synchronously, either will receive its record in exact time; and it is always possible thereafter to start in true register with each other, the records as synchronously produced after such marking; it only being necessary to bring into operative position the corresponding signal marks and start the two machines.

In my said combined machine shown in said co-pending application there was no means whereby exact synchronism could be secured in said reproducing apparatus between the motion of the auditory and visual records, nor has there heretofore been any means whereby it was possible to start said records in a reproducing apparatus with the exactitude necessary for producing an actual synchronous reproduction of the naturally connected auditory and visual performance.

It is understood and practically demonstrated that the lapse of time between the reception of the visual and auditory impressions upon the sensory nerves and the voluntary operation of mechanism by the hand of the person receiving such sensations is so great as to produce a discordant effect by reason of a hiatus or lapse between the production of a motion picture action and a sound record action where the starting of the sound record for the purpose of synchronizing with the motion picture has been effected through the medium of an attendant observing the picture and operating the starting mechanism for the sound record.

It is necessary for satisfactory synchronism of the reproduction of the two records that apparatus such as described in my co-pending application be started by means superior to any that have heretofore been known, otherwise the reproduction will be unsatisfactory except by accident or exceeding skill upon the part of the operator.

An object of this invention is to make provision whereby the records can be invariably synchronized with absolute accuracy at the beginning or at any part of the motion picture action where it is desired to introduce the sound action. This I have accomplished by providing a combined phonographic and motion picture machine having means for producing photographic and auditory records in unison, means for marking the photographic record, means for marking the auditory record, and mechanism connected

with both said marking means to simultaneously operate the same, and I regard the invention as basic and pioneer in that I provide connected mechanical markers for simultaneously establishing an index marking on a photographic and also on a phonographic record device; there being means for moving said record device at the time of such marking whereby the index markings are placed at the inceptive points of dual operation of said devices to establish perfect registry of the records for reproduction in unison. The index markers should produce upon the picture record device and upon the auditory record device, record index marks of like length for the reason that the beginning of one signal before the other, or the continuation of one signal after the other had ceased would leave the operator without any exact index of the points that are to register with each other. By my invention the index marks on both record devices are made of equal duration as will be fully understood from the subjoined description and the accompanying drawings.

Other objects will be disclosed as the description progresses.

The invention possesses advantageous features that, with the foregoing, will be set forth at length in the following description, where I shall outline in full that form of invention selected for illustration in the drawings accompanying and forming part of the present specification.

The novelty of the invention will be included in the claims succeeding said description. From this it will be apparent that I do not restrict myself to the showing made by said drawings and description as I may adopt many variations within the scope of my invention as expressed in said claims.

The interval of variation permissible in the register of the parallel records of the respective machines reduces the production and reproduction of successful dual records to a matter of the finest adjustments of speed and register.

An object of this invention is to secure perfect register between the two records for simultaneous reproduction.

To insure definite uniformity in the speed of the respective machines, the most practical method, as set forth in said co-pending application is to mount the phonograph record mandrel on an integral extension of the drive shaft of the motion picture camera.

For ease in elucidation, it is well to fix in the mind that in the present instance both the visual and the auditory records are linear. The photographic or visual is a succession of pictures. The phonographic or auditory is an indented line on a cylinder, tape or disk, or it may be a Paulsen magnetic record on a steel wire. This gives two or more parallel records moving forward at



a uniform speed, each record distinct and independent of the other in its inherent qualities, but interdependent for the desired compound result.

5 There are periods in most performances (that might be the subject of the recording machines) wherein the action will proceed in silence. For instance, the placing of a blast would be interesting visually and have  
10 no auditory interest until the moment of explosion and then the sounds of the explosion should be reproduced until its echoes die away. Therefore, it is necessary to introduce means for simultaneously and  
15 definitely index marking the inceptive points where it is desired that the plural records begin to coöperate. Because of its flexibility in transmission, and instantaneous action, and for other important reasons, the marking  
20 of the several records is preferably accomplished electrically.

In the drawings: Figure 1 is a side elevation of a combined machine constructed in accordance with this invention. Fig. 2 is a  
25 plan view from above of the battery box holding the portable source of electric energy for operating the various circuits illustrated in Fig. 1 and is to be read in connection with that figure. A microphone trans-  
30 mitter is also shown in the same circuit with the film marker and phonographic record marker, which latter comprises a telephone receiver and an auditory signal device to intermittently actuate said receiver. Fig. 3  
35 is a wiring diagram illustrating the electrical means for marking or indexing the independent records. Fig. 4 is an end elevation of the sound absorbing universal joint interposed between the contiguous ends of  
40 the shafts of the camera and phonograph. Fig. 5 is a plan view of the same in cross section taken on the line V—V. Fig. 6 is a full-sized detail in side elevation of the magnetic film marker for marking the photo-  
45 graphic record or negative. Fig. 7 is a diagrammatic plan of the alternate pneumatic means for simultaneously marking the companion records.

In the combined phonographic and motion  
50 picture machine, any suitable means for producing photographic and auditory records in unison may be employed; and in combination with such means, I provide in the present instance means for marking the  
55 photographic record device, means interdependent therewith for marking the auditory record device, and means under control of the operator for simultaneously operating said record device marking means, as will  
60 now be fully disclosed, so that the index marks established upon the photographic negative and upon the master sound record may be reproduced respectively upon the positive film and the companion sound re-  
65 cord device in such a manner that said film

and its companion sound record device can be brought into perfect registry in the reproducing machine. These index markers are of use in machines of mathematical pre-  
70 cision to synchronously operate the auditory and visual records, an object being to have the initially moving record to control the starting of the record to be synchronized therewith.

In detail the construction consists of the  
75 usual motion picture tripod 1, of the portable outfit for making motion picture records, or any suitable table or foundation in the fixed or reproducing outfit. The base consists of a platform 2 to receive the cam-  
80 era 3, and having the side extensions 4 forming a hollow frame in which the phonograph 5 provided with recording mechanism is hung. This base is revoluble on the hori-  
85 zontal plane around the vertical pivotal pin 6, fixed on the tripod head 7. The phonograph is fixed to the base board 8 resting upon the resilient balls 9, extending into hemispherical sockets at the four corners in  
90 the base board. These balls are also confined within similar sockets formed in the sub-base 10 that is hung in the hollow frame by the supporting brackets 11, fixed to the  
95 side bars 4. The frame is steadied by the straps 12, extending from the top of the camera at 13 to the ends of the frame at 14 on both sides. All extraneous vibrations that might reach the phonograph through  
100 the base are absorbed by the hollow rubber balls 9. This peculiar construction of vibration absorbing mounting will be claimed in a separate application for patent. The extension sleeve couplings 15 and 16 are respec-  
105 tively fixed to the ends of the drive shaft of the camera and the intermediate shaft 17. These sleeves are provided with the flanges 18 and 19 that are fixed to the heads 20 and 21 that are joined together by being fixed  
110 (preferably by adhesion) to the annular wooden or fiber ring 22. This drum-like structure is vented through the hole 23 to relieve any concussion due to end thrust from either of the joined shafts, or the heads may be open in spider-like construction. The heads 20 and 21 are preferably of  
115 oil-impregnated flexible leather, or sheet rubber, having sufficient tensile strength to transmit the power necessary for rotation without buckling or distortion. Having no sound-conducting properties, the heads 20  
120 and 21 isolate the respective machines and break up any sound vibrations in the respective drive shafts. The flexibility of this novel coupling also compensates for any disalignment of the joined shafts and  
125 acts as a "universal joint." The extension arm 24 is attached to the side of the phonograph at 25. The pillar bearings 26 attached to this arm act as mountings for the shaft 17. This shaft is fixed in axial align-  
130



ment with the mandrel shaft extension 27 of the phonograph, journaled in the out-bearing 28 mounted on the arm 24.

The magnetic clutch comprises the magnets 29—29 fixed upon the core bar 30, that is fixed upon the end of the shaft 17 and the armature disk 31 that is slidably splined on the end of the extension shaft 27. It is the function of this clutch to instantly and positively set, to start the phonograph mandrel rotating at full speed when the clutch circuit is closed, as hereinafter described. The shaft 17 rotates constant with the camera shaft. The relative heavy fly wheel 32 fixed upon the shaft 17 has more than sufficient stored momentum at all times to overcome the inertia of the phonograph mechanism, to instantly start the same at full speed when the magnetic clutch locks. For the sake of effect, it is sometimes desirable that the phonograph be operated only when the exigencies of the subject of the record call for it. Hence necessity for starting the sound record at various times during the production may arise. Said starting must be such that absolute unison in the making of the companion records being taken is secured, whereby in their subsequent reproduction the absolute unison of the selected portions of the phonographic records can be interjected in perfect register with the contemporaneous portions of the photographic record.

The motion picture camera is conventional in general construction. The electro-magnetic film marker consists of the magnetic coils 33 preferably fixed upon the plate 34 hinged to the frame of the drive mechanism. This plate is the swinging cover for the film guide and exposure opening. The armature 35 of the coils is pivoted at 36 and provided with the downward extension arm 37 provided with a marking point 38 extended through a perforation in said cover plate. The upper end of this arm is bent at a right angle 39 on the opposite side of the pivot and is provided with a tension spring 40 with its opposite end attached to the bracket 41 fixed to the cover plate. The function of this spring is to keep the marking point out of contact with the film when the magnet is inoperative. When the magnet is energized as hereinafter described, the marking point is held in contact with the traveling film, in which it makes a visible score line. By closing the switch 42 of the magnetic clutch circuit, the phonographic record device 43 is made to rotate in unison with the drive shaft of the motion picture machine or camera ready to receive both the index marks and the sound record from the telephone receiver 51.

In a split circuit with the photographic record marker 45, there is provided a sound record marker in the form of an auditory

signal device, as the buzzer 46, constituting an electro-vibrant auditory record marker that is also in circuit with the phonographic recording mechanism 59 for operating said telephone receiver at the will of the operator to make the auditory index marks on the record device 43. By this means an auditory mark may be made on the phonographic record device 43 through the medium of the telephone receiver 51, which forms a part of said recording mechanism, at the same instant that the film is marked by the photographic record marker.

The switch mechanism shown at 44, 60 and 61, in Fig. 3, is designed for simultaneous and alternative operation of the markers or indexing devices 45 and 46. To mark the records simultaneously, the switch 44 alone is closed, or in lieu thereof the switches 60 and 61 may be simultaneously closed; thus simultaneously energizing the electro-magnets of said markers and thereby operating the markers. To mark the records alternatively or independently of each other, the switch 44 being open, either of the switches 60 or 61 may be closed as required for the desired marking.

For taking sound records at a distance not possible with the ordinary phonographic recorder, the receiving horn 47 is provided with a telephonic transmitter 48 attached to a flexible cable 49, and wired in the usual way through a battery 50, an induction coil and a telephonic receiver 51 in operative relation with the recording mechanism of the phonograph. The switch 62 in the battery circuit is provided to switch off the battery when it is not in use.

The above description discloses the mechanical elements of a combined machine for simultaneously taking photographic and phonographic records in unison. The following description will disclose the electrical, mechanical and manual control of the various elements recited. By sound part is meant the parts of the performance which are addressed to the auditory senses.

In many cases such as operatic performances where it is desired that the action and sound accompaniment shall be continuous throughout the entire performance, the switch 44 will be momentarily closed by the operator before the performance begins, thus establishing on both record devices an index-marking by which the registry of the two records may be set for reproduction. After this initial indexing further indexing can be accomplished in like manner or by closing the switch 60, at any part of the production at which it is desired to introduce or omit the sound part.

It may sometimes be desirable to introduce a sound part artificially. For the sake of realism, presume that the camera is focused upon an approaching warship; dis-



tance or other circumstances make it inadvisable to attempt sound recording. A silent picture of the approaching vessel is taken until such time as salutes or other sounds are produced, of which a companion sound record is desired. During the interval in which the camera was taking a silent motion photographic record, the phonograph remains inoperative. The instant the operator closes the switch 42 on the camera, that closes the clutch circuit, the energized magnets of the clutch attract the armature 31 and cause the mandrel of the phonograph carrying the wax record 43 to rotate. The operator then closes the switch 44 that closes the proper circuit to energize the dual marking devices 45 and 46. This action causes the film marker to score the film and the phonograph record marker to mark the sound record; thus establishing an initial, inceptive index point at which the dual companion records register. After the dual records have been made as above described, they are prepared for reproduction as follows: The photographic record is developed and processed to produce a photographic negative. Positives are printed from this negative. Each positive print discloses the index marks made on the negative by the film marker. These marks can be modified in any desirable manner to conform to the type of machine by which they are to be projected. The most desirable method is to perforate the record at or near the mark and use this perforation as a port in a pneumatic device adapted to operate a switch controlling the electro-magnetic clutch to start the phonographic record as set forth in my United States Patent, No. 1,065,576, June 24, 1913. Electric contact may be made through this port by contacts on opposite sides of the film to operate the starting clutch. Various means of utilizing the film marks are sufficiently obvious. The audible mark made on the phonographic record will manifest itself when the reproducing stylus reaches it. The vital requirement is that the inceptive points of the first co-action of the two records be absolutely in unison in the subsequent reproductions. For the perfect results that can be attained with the records marked by my present invention more than mere synchronism is possible. The register of the inceptive points can be reduced to an infinitesimal unit of time, and a register maintained throughout the performance.

The alternative pneumatic system of operating the record markers consists of the closed box 52 having the flexible diaphragm 53. This box is mounted on the cover 34, and has the marking point 54 fixed to the pivoted arm 53, whereby the pressure of the bulb 55 communicated through the tubing 56 distends the diaphragm 62 forcing

the marking point into contact with the record film. The audible signal for the auditory record consists of a reed signal 57 connected to the bulb by the tubing 56 and located in the auditory horn. The back pressure in the tubing due to the fluttering of the reed is sufficient to cause the necessary distention of the diaphragm 53. The horn, 58 may be attached directly to the sound recording mechanism 59 of the phonograph. The pressure of the bulb 55 causes a visible mark on the photographic record, and an audible disturbance that makes its mark on the auditory phonographic record.

For simplicity in description the simultaneous index marking of two records only has been described. It is obvious that a multiplicity of consistent records might be so made and suitably marked. For instance, a phonographic, a photographic, an automatic piano record and a modified record for controlling variations in the lighting of the subject, etc. Such combinations are now contemplated by me, and I do not wish to be confined to the simplified disclosures herein in the interpretation of the scope of my invention.

The form of machine shown in Figs. 1 and 3 is adapted for both simultaneous and alternative marking. For simultaneous marking the button 44 is pressed, and for alternatively or independently indexing the several records the separate button switches 60 and 61, respectively controlling the film marker circuit and the audible record marker may be alternatively pressed. These divisional circuits can be multiplied as often as the number of independent records demand. Each switch can operate through a bus bar with a proper means for operating all switches simultaneously, should circumstances require.

The buzzer 46 when in action is included in the primary circuit of the induction coil and opens and closes the circuit as it vibrates. These vibrations act upon the magnets of the telephone receiver in the secondary circuit causing the telephone receiver diaphragm to vibrate in synchronism with the vibrations of the buzzer. The vibrations of the telephone receiver diaphragm act indirectly upon the recording means of the talking machine through the medium of air wave impulses and not by direct mechanical connection.

I claim:

1. Means for marking photographic and auditory records produced in unison, including an electric circuit; an electro-magnetic film marker, an electro-vibrant auditory record marker and a switch in said circuit.

2. Means for marking photographic and auditory records produced in unison, including an electric circuit; an electro-magnetic film marker, an electro-magnetic auditory

recording device, an electro-magnetic audible signal device operatable by said circuit, a battery and a switch in said circuit to control the operation of said marker and device; and telephonic connection whereby said audible signal device operates the auditory recording device.

3. Means for simultaneously marking photographic and auditory records produced in unison, including an electric circuit, an electro-magnetic film marker, an audible signal, a battery, a telephone transmitter, an induction coil, a telephone receiver in operative relation with said auditory recording device and a switch in said circuit; said film marker, signal device, telephone transmitter, induction coil, telephone receiver and record device all being operated by said circuit.

4. In a machine such as described, a motion picture camera and an auditory recording mechanism driven in unison, a film marking device mounted on said camera consisting of a magnet and a pivoted armature therefor, a marking point on said armature contiguous to the film passage of said camera, a record-marking device for said auditory recording mechanism, and means for operating both of said marking devices in unison.

5. In a machine such as described, a motion picture camera and an auditory recording mechanism driven in unison, a film marking device located contiguous to the film passage of said camera, and a record marking device consisting of a telephonic receiver in operative relation with the said auditory recording mechanism and a battery and a switch in the circuit with said receiver, and means for operating both of said marking devices in unison.

6. A phonographic and motion picture machine comprising an electric circuit, sound recording mechanism in said circuit, a signal device in telephonic connection with said sound-recording mechanism by means of said electric circuit, and a switch for said circuit.

7. In a phonographic and motion picture machine, an electric circuit, sound recording

mechanism in said circuit, a signal device in telephonic connection with said sound-recording mechanism through said circuit, photographic record mechanism, means controlled by said circuit for intermittently marking the photographic record, and switch means for controlling said circuit.

8. Means for marking photographic and auditory records produced in unison for the purpose of establishing a point of registry between said records for synchronous reproduction, comprising a film marker, electro-magnetic means for operating the same, an auditory signal device, electro-magnetic means for operating said signal device, an electric circuit to operate said electro-magnetic means, a switch to control said circuit, means to produce auditory records and telephonic connection between said auditory signal device and the means for producing auditory records, said telephonic connection being operable with said circuit.

9. Means for marking photographic and auditory records produced in unison, comprising an electric circuit and an electro-magnetic film marker, a telephonic phonographic recording device, and an electro-magnetic audible signal device all operable by said circuit; said audible signal device being in telephonic connection with said auditory recording device; and a switch to open and close said circuit.

10. Means for producing a sound record, means for producing a photographic record, said means being connected for simultaneous operation, an auditory signal device, an electric circuit forming telephonic connection between the sound recorder and the signal device, an electro-magnetic marker for the photographic record, said marker being in circuit with said auditory signal device, and means to control said electric circuit for operating said markers.

In testimony whereof, I have hereunto set my hand at San Francisco, California, this 10th day of December, 1912.

EDWARD H. AMET.

Witnesses:

BALDWIN VALE,  
J. B. GARDNER.



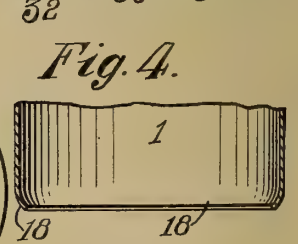
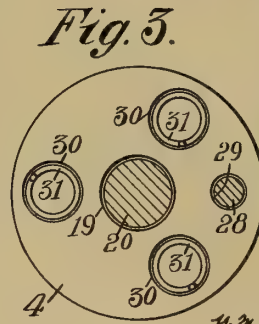
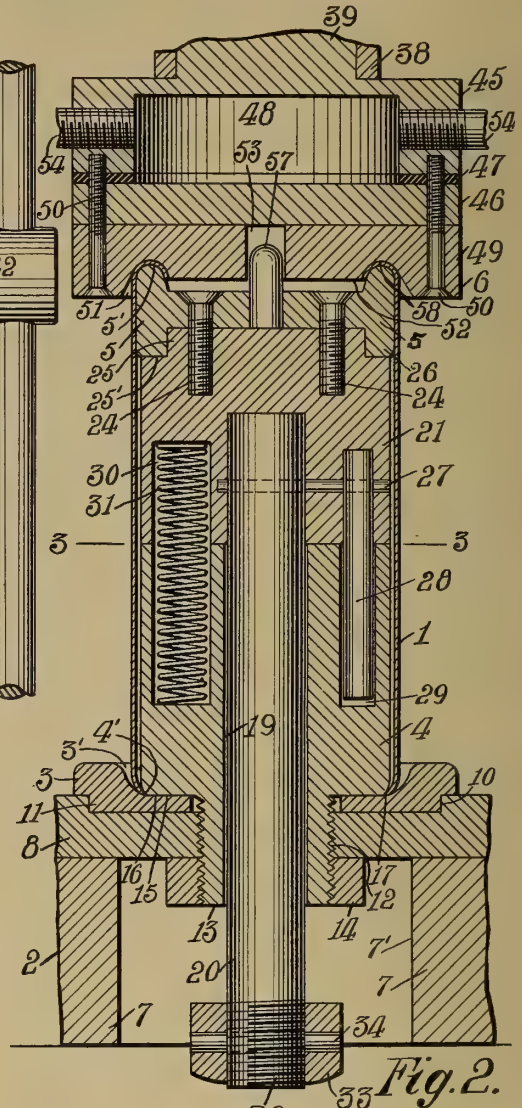
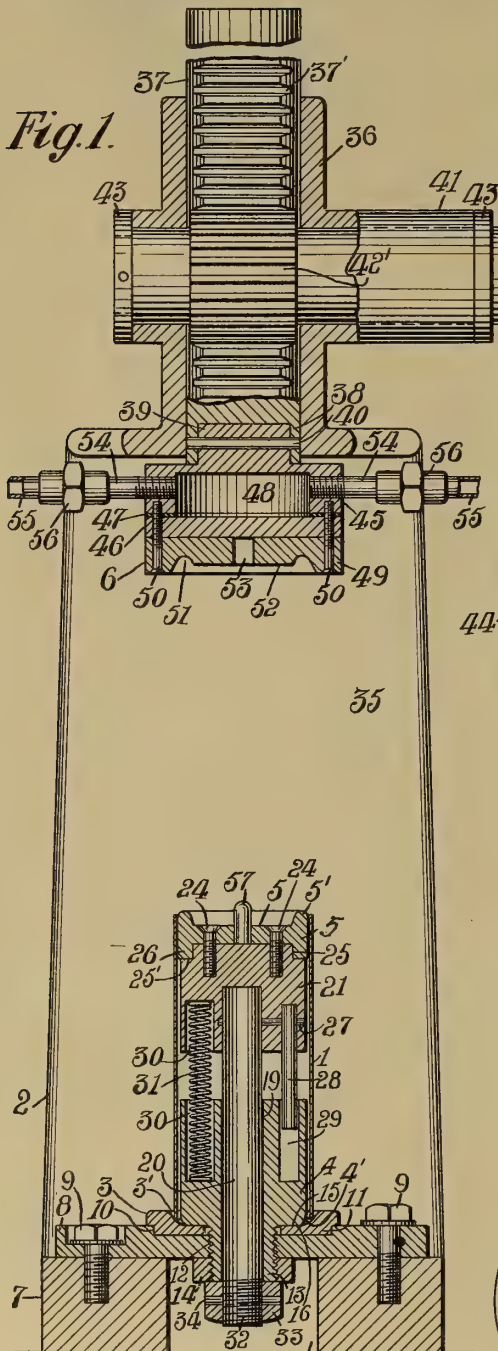
PHONOGRAPHIC MOLDING APPARATUS,  
# 1,162,800-----W. F. Nehr,  
Patented-December 7th, 1915.  
Filed-February 24, 1914.



W. F. NEHR.  
 PHONOGRAPHIC MOLDING APPARATUS.  
 APPLICATION FILED FEB. 24, 1914.

1,162,800.

Patented Dec. 7, 1915.



WITNESSES  
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 his ATTORNEYS

# UNITED STATES PATENT OFFICE.

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## PHONOGRAPHIC MOLDING APPARATUS.

1,162,800.

Specification of Letters Patent.

Patented Dec. 7, 1915.

Application filed February 24, 1914. Serial No. 820,560.

*To all whom it may concern:*

Be it known that I, WILLIAM F. NEHR, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographic Molding Apparatus, of which the following is a description.

My invention relates to phonographic molding apparatus and more particularly to apparatus for shaping the ends of hollow cylinders which are used in the manufacture of records of celluloid or the like.

The principal object of my invention is to provide apparatus designed to shape both ends of the celluloid cylinder simultaneously thus making it possible to complete the formation of the record in a much shorter period and at a reduced cost.

A further object of my invention is to provide apparatus of the class referred to which will engage the cylinder only at the ends thereof; whereby the danger of scratching, cracking or otherwise damaging the cylinder is greatly reduced. In the preferred form of my invention, I provide a set of die members formed to engage one end of the cylinder and curl over the edge thereof and a device having an annular converging recess of contracted diameter at its inner end for engaging the other end of the cylinder and curling the edge thereof inward to the desired extent.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings forming a part of this specification, and in which—

Figure 1 is a vertical section of one form of apparatus embodying my invention. Fig. 2 is a vertical sectional view of the main parts of the same, showing the apparatus in operative engagement with the ends of the celluloid cylinder. Fig. 3 is a sectional view on the line 3—3 of Fig. 2, the celluloid cylinder being omitted; and Fig. 4 is a sectional view of the lower edge of the celluloid cylinder after the required shape has been given thereto.

In all of the views, like parts are designated by the same reference characters.

Referring to the drawings, the celluloid

cylinder which is to have its ends shaped is indicated at 1, and the apparatus for engaging and forming this cylinder is indicated as a whole by the numeral 2. The apparatus comprises a die plate 3, the upper face of which is dished out, providing a shallow recess; and in central position on the bottom of this recess rests a die member 4. The recess in the top of the plate 3 is circular in horizontal section and curved downwardly and inwardly toward its bottom, which is preferably a plane surface; and the die member 4 is cylindrical and of less diameter than the recess, the bottom of member 4 being joined to the cylindrical lateral surface of said member by a rounded surface 4' arranged directly above the curved portion of the recess in the top of plate 3. As a result, there is formed an annular space 3' between the surface 4' and the curved surface of this recess, this space being of such a shape that the sides thereof converge inwardly toward the bottom of the same. Consequently when the cylinder 1 is placed with its lower end in this annular space, and is pressed downward, the bottom edge thereof is forced inward and thus curled over. The die member 5 has on its upper end a raised rim 5', the corners of which are rounded off. Normally the die member 5 is supported at such a height that it projects slightly above the cylinder 1 (see Fig. 1); but it is adapted to be pressed downward by means of a hollow head 6 carried at the top of the apparatus 2. When the hollow head 6 descends, the upper end of the cylinder 1 is curled inwardly and over around the raised rim 5' on the die member 5, as shown fully in Fig. 2, the head 6 having portions shaped to cooperate with the upper face of the die member 5 for this purpose, as will be hereafter more fully described.

The frame of the apparatus 2 is supported upon a base 7; and on the upper sides of this base a base plate 8 is secured by any suitable fastening means, such as bolts 9. This base plate has a shallow circular recess 10 formed in its upper face and on the lower face of the die plate 3 is a boss 11 which fits snugly into this recess. The body of the plate 3 is of greater diameter than the boss 11, or the recess 10, and forms a shoulder surrounding the boss which rests upon the upper face of the plate 8. The plate 8



has a central threaded opening 12; and the die plate 3 also has a central opening in line with the threaded opening 12, to permit a threaded boss or nipple 13, formed on the lower end of the die member 4 to be screwed through the base plate 8. The opening through the plate 3 is preferably not threaded. A lock nut 14, screwed upon the lower end of the threaded nipple 13 and bearing against the lower surface of base plate 8 secures the die plate 3 and the die member 4 to the base plate. At the base of the nipple 13, die member 4 is provided with an annular shoulder 15 in the form of a plane surface which rests upon the bottom 16 in the recess of the plate 3.

As stated above, the die member 4 is rounded off adjacent the outer portion of the shoulder 15, as indicated at 4' and forms with the wall of the recess in the upper face of the die member 3 the annular space 3'. The curvature of the outer portion of the recess in the plate 3 is such that the wall of said recess merges smoothly into the surface of the bottom 16. As a result the annular space 3' converges downwardly and inwardly in a smooth curve. The lower end of the cylinder 1 is adapted to fit into the space 3'; and it will be apparent that when the lower end of the cylinder 1 is forced downwardly, it will be contracted and forced inwardly to form a curved flange, indicated at 18 in Fig. 4.

The die member 5 is mounted above the die member 4, and resiliently supported thereon, in a manner to be hereinafter described, so as to be normally held up to a certain height. This die member 5 is movable up and down with respect to the die member 4 and to provide means for guiding the member 5 in such movement, the member 4 is provided with a vertical central bore 19 through which passes a guide stem 20. This guide stem 20 is secured in a bore formed in a member 21 secured to the under side of the upper die member, and it slides through the bore 19 freely within certain limits. The die member 5 is in the shape of a disk having on its upper face a round circumferential rim 5' referred to above, this member being secured to the top of the member 21 by means of fastening devices, such as screws 24. In order to center this disk on the member 21, I may form a central boss 25 on the upper face of the member 21 and surround the same by an annular shoulder 25'. The lower face of the disk 5 is formed with a depending flange or rim 26 which fits around the boss 25 and rests upon shoulder 25'. The stem 20 will, therefore, act as a guide for both the member 21 and the die 5 when they are moved relatively to the lower die member 4. I preferably drive a pin 27 into the member 21 from one side thereof and I form alined

bores in this member and the top of the stem 20 to receive the pin 27. I also form a bore in the member 21 to receive a pin 28 and I preferably locate this bore and the pin 28 in the path of the pin 27 and form a hole through the top of the pin 28 to receive the pin 27. The one pin 27, therefore, serves to hold the member 21, the stem 20, and pin 28 together. The pin 28 fits slidably into a bore 29 in the lower die member, and thus holds the die members 4 and 5 against relative rotation while permitting relative up and down movement of member 5. The lower die member is provided with a plurality of bores or recesses 30, three of the same being shown in Fig. 3; and the member 21 will have bores 30 in its lower face in registry with the bores 30 in the die member 4. Each of the bores 30 in the lower die member 4 and its alined bore in the upper die member 5 contains a coiled spring 31, these springs serving to support the member 21 and the die member 5 and to space the same from the die member 4 while at the same time allowing the member 21 and the die member 5 to be depressed. The upward movement of the die member 5 is limited by a nut 33 screwed on the lower end of stem 20. The bore 19 opens through the nipple 13 and the nut 33 is located together with the nut 14 and the lower ends of the nipple 13 and the stem 20 in a central opening 7' passing vertically through the base 7. To hold the lock nut 33 in place a pin 34 may be driven through it and the stem 20. The springs 31 normally hold member 5 in the position shown in Fig. 1, with the rounded rim 5' slightly above the upper end of the cylinder 1 and the lower end of the pin 28 in the upper end of the bore 29. This last named bore is long enough to allow the member 21 to be forced down upon the die member 4 when the upper die member 5 is engaged by the die head 6.

The frame of the apparatus 2 comprises a standard 35 rising from the base 2 and supporting a vertical bearing 36. The vertical axis of this bearing is in line with the vertical axis of the die members 4 and 5 and the bearing contains a sliding plunger 37 to the lower end of which the die head 6 is secured. For this purpose the lower end of the plunger 37 is bored out, providing a rim 38; and the upper end of the die head 6 is provided with a boss 39 which fits into the bored out end of the plunger 37. A pin 40 is driven through a hole in the boss 39 and the plunger 37 to secure the same together. The standard 35 is preferably cast integral with bearing 36 and with a horizontal bearing 41 in which is mounted a spindle 42. The spindle 42 is provided with collars 43 engaging the bearing 41 at both ends of the latter to hold the spindle against longitudinal movement and is further provided with



a handle 44 by which the spindle may be turned. The function of the spindle 42 is to raise and lower the plunger 37, and for this purpose the plunger 37 may be provided with vertical rack 37' and the spindle 42 may be provided with a pinion 42' engaging the rack teeth.

The die head 6 is hollow to enable a heating agent to be supplied to the interior thereof and it is constituted of several sections. The upper section is in the form of an inverted cup 45 having the boss 39 projecting therefrom; this cup being closed by means of a cover 46. A suitable packing ring 47 is placed between the cup 45 and the cover 46. A closed space 48 is thus provided to receive the heating agent. To the lower face of the cover 46 is secured a disk 49 shaped to receive and cooperate with the raised rounded rim 5'. Fastening devices, preferably in the form of screws 50, pass through the disk 49, cover 46, and packing ring 47 and into the section 45 to hold all of these parts together. In the lower face of the disk 49 is a groove 51 the outer wall of which is deeper than the inner wall, the outer wall flaring downwardly and outwardly as shown. This groove 51 is rounded at the bottom to correspond in shape with the rounded rim 5' of the die member 5, and the disk 49 is provided with a central boss 52 of less height than the outer wall of groove 51, the boss 52 fitting within the rim 5' when the die head 6 is forced down upon the die member 5. The boss 52 has a central opening or recess 53 for a purpose which will be referred to hereinafter. The sides of the section 45 have threaded openings therethrough to receive threaded tube sections 54 connected to flexible conduits 55 by means of couplings 56. The conduits 55 permit the passage of steam through the space 48 of the die head to heat the same and thereby facilitate the formation of the upper end of the celluloid cylinder 1 when the die head 6 engages the same. In a central opening formed in the die 5, I secure a stud 57 having its outer end rounded off, this stud being designed to enter opening 53 to act as a guide and to insure the centering of this die member 6 when the latter moves downward into engagement with the cylinder 1.

The operation of my invention will now be apparent. At the start with the die head 6 elevated, I slip a celluloid cylinder over the die members 4 and 5. At this time the die member 5 is held up by the springs 31; and the rounded rim 5' of the die member 5 projects above the upper end of the hollow cylinder 1 to a slight extent. I preferably make the die section 5 of the proper diameter to fit snugly inside of the cylinder 1. The lower edge of the cylinder 1 will engage the outer wall of the annular space 3', above the bottom of said space, as shown in Fig.

1. Steam or other suitable heat is supplied through the conduits 55 to the space 48 and the handle 44 is then turned to force the plunger 37 downward. The die head 6 now moves into the position shown in Fig. 2 and the rim 5' enters the groove 51. The diameter of the groove 51 across the outer edges of the same is larger than the diameter of the cylinder 1; and as the plate 49 is forced down upon the cylinder, the upper end of the latter is curled over inwardly and downwardly; the inside surface of the groove 51 acting to bend the upper edge of the cylinder down over the rounded rim or rib 5', thus forming the upper end of the cylinder 1 with a neat round flange shown enlarged at 58 in Fig. 2. In order to finish the flange 58 at the top, it is necessary to apply some pressure to the cylinder through the head 6. The die member 5 and the member 21 are, therefore, forced down against the action of the springs 31 until member 21 engages the top of the die member 4, this taking place before the operation of forming the upper edge of the cylinder is finished. This downward pressure imparts some endwise or axial movement to the cylinder 1 in a downward direction; forcing the lower end of the cylinder 1 farther into the annular space 3'; and as the diameter of this space contracts toward its lower end, the result is the formation of the rounded edge 18 at the bottom of the cylinder. This edge is simply curved inward to a slight extent and not returned upon itself like the edge 58, so that the application of heat to the lower edge of the cylinder 1 to soften the celluloid and facilitate the operation is not required. When the operation is finished, the handle 44 is turned to raise the die head 6 and the cylinder 1 removed. The cylinder 1 is somewhat resilient and as it is turned inwardly at its lower end only to a slight extent, it can be slipped over the die 5 in spite of the flange 18 at its lower end.

It will be observed that in the course of the above operation, the celluloid cylinder is engaged and worked at its ends only, and the liability of scratching or otherwise marring the body of the cylinder is greatly lessened for this reason. A single operation of the apparatus is all that is required to give the requisite shape to both ends of the record cylinder, and these ends can, therefore, be properly formed in a very short space of time. The flexible conduits 55 permit continuous communication between the space 48 and the supply of the heating medium for all positions of the head 6; so that the said head is always kept at the right temperature. Likewise, the apparatus comprises relatively few parts and is simple in its construction.

I wish to have it understood that the de-

scription and drawings disclose merely a preferred form of my apparatus and I do not wish to be limited to the exact construction therein set forth.

5 What I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a device of the class described, the combination of means having an annular tapering recess for forming one end of a cylinder, means for forming the other end of a cylinder, one of said means being movable toward and away from the other means, spring means tending to force said forming means apart, and means for forcing said movable forming means toward the other forming means and forcing the cylinder toward the bottom of said recess, substantially as described.

20 2. Apparatus for forming a hollow cylinder with inturned ends comprising inner and outer die members for forming one of said ends, a die for forcing the other end inwardly, and means for effecting substantially simultaneous action of said die members, substantially as described.

3. Apparatus for forming a hollow cylinder with inturned ends comprising inner and outer die members for forming one of said ends, a die for forcing the other end inwardly, means for effecting substantially simultaneous action of said die members, and means for supplying a heating agent to one of said die members, substantially as described.

4. Apparatus for forming the ends of a

hollow cylinder with inturned edges, comprising a stationary die for forcing one end of the cylinders inwardly, inner and outer die members movable relatively to said first named die members for forming the other end of the cylinder, said die members being arranged to act simultaneously upon the opposite ends of the cylinder, and means for supplying a heating agent to one of the relatively movable die members, substantially as described.

5. Apparatus for forming the ends of a hollow cylinder with inturned edges, comprising stationary die members for forcing one end of the cylinder inwardly, and inner and outer die members movable relatively to said first named die members for forming the other end of the cylinder, said die members being arranged to act simultaneously upon the opposite ends of the cylinder, substantially as described.

6. Apparatus for forming the ends of a hollow cylinder with inturned edges, comprising a stationary die for forcing one end of the cylinder inwardly, inner and outer die members for forming the other end of the cylinder, and spring means tending to move said inner member toward said outer member, substantially as described.

This specification signed and witnessed this 20th day of February 1914.

WILLIAM F. NEHR.

Witnesses:

FREDERICK BACHMANN,  
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE,

# 1,163,120-----C. E. Woods,  
Patented-December 7, 1915.  
Filed-August 30, 1913.



C. E. WOODS.  
GRAPHOPHONE.  
APPLICATION FILED AUG. 30, 1913.

1,163,120.

Patented Dec. 7, 1915.

Fig. 1.

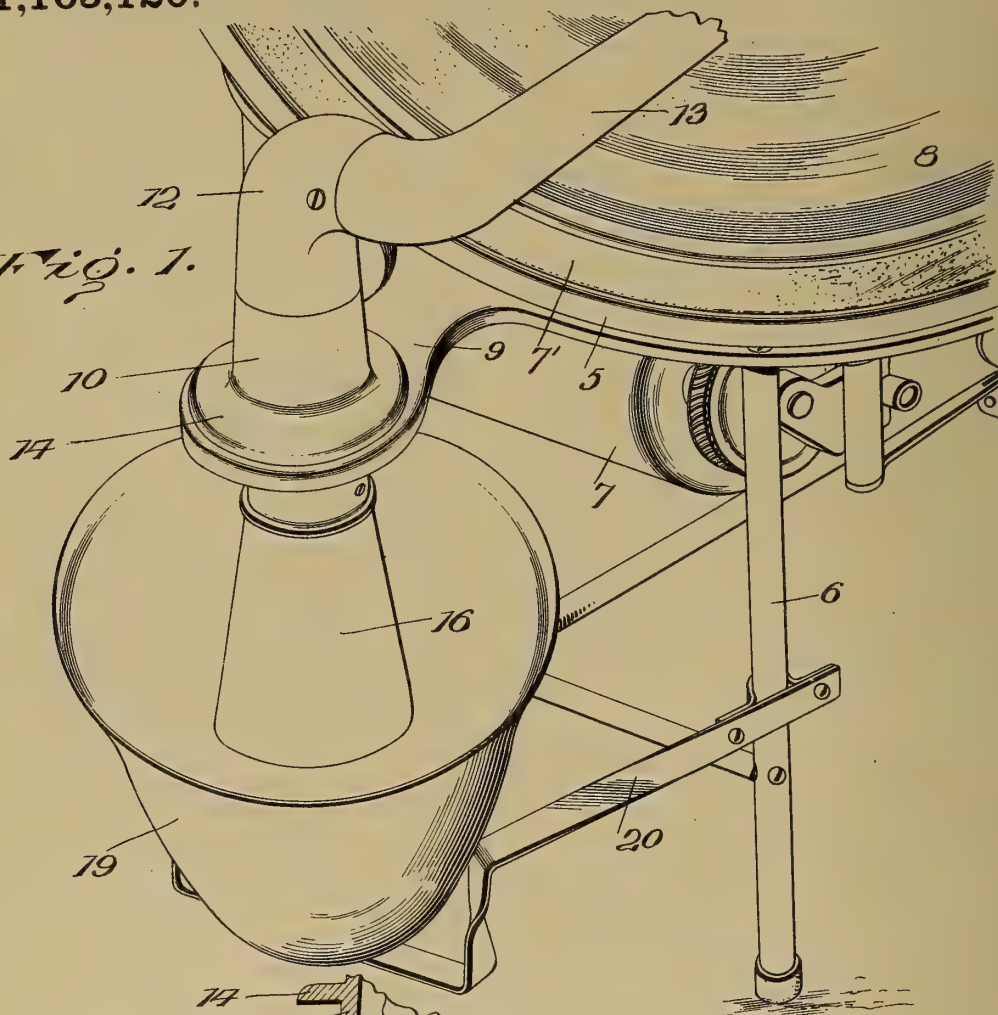
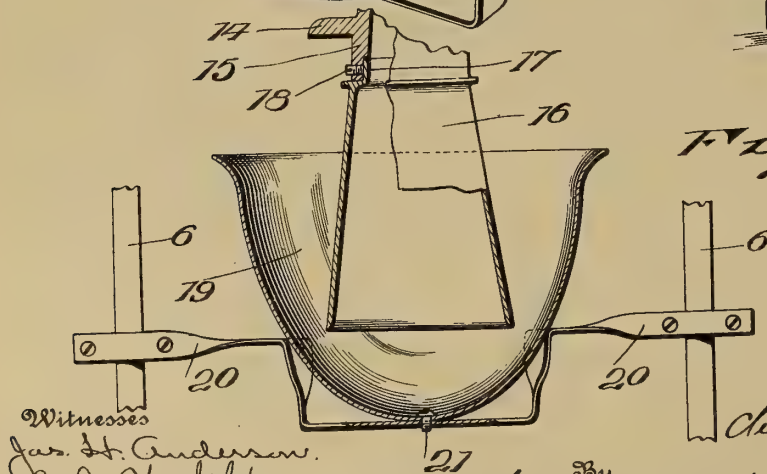


Fig. 2.



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CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## GRAPHOPHONE.

1,163,120.

Specification of Letters Patent. Patented Dec. 7, 1915.

Application filed August 30, 1913. Serial No. 787,459.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Graphophones, which invention is fully set forth in the following specification.

The present invention is an improvement in graphophones, and the object of the invention is to provide a hornless machine of simple, compact and cheap construction, which will emit an increased volume of sound, and deliver the sound waves uniformly in all directions.

The invention will be better understood by reference to the accompanying drawing, illustrating one expression of the inventive idea, and wherein—

Figure 1 is a perspective view, partly broken away, of a talking machine provided with the invention; and Fig. 2 is a detail vertical section, partly in elevation, showing the deflector and the tube that conveys the sound waves thereto.

Referring to the drawing, wherein like reference numerals in the two views indicate like parts, 5 represents a motor board supported by any suitable means such as a plurality of legs 6. To the under side of the board is secured, in any suitable manner, a motor 7, here shown as a spring motor. A turn-table 7' is driven by said motor and with it the sound record 8. The motor board is provided with a perforated ear 9 on which is mounted a hollow support 10 for the tone arm, which latter comprises, preferably, a horizontal member 13, on the free end of which latter is secured a sound box (not shown), and an elbow 12 to which the member 13 is horizontally pivoted. The vertical leg of the member 12 is vertically pivoted on the hollow support 10, the support serving to permit movement of the tone arm including the elbow about a vertical axis but to hold the elbow against other movements. The hollow support 10 is provided with a flange 14, which rests on the ear 9 adjacent the perforation therein, and an extension 15 which projects downwardly through said perforation and in engagement with the walls thereof. Secured to said extension in any suitable manner is a downwardly projecting tone tube 16, preferably tapering in shape, and, as here shown, being provided at its upper end with a flange 17 engaging the

inside of the extension 15, said tube being held in place by a screw 18 which passes through the extension 15 and engages the flange 17. Any suitable means for securing tube 16 in place may, however, be employed. Said tube projects into a parabolically shaped reflector 19 which, as here shown, is supported by a bracket 20 in any suitable manner, as by a screw 21, said bracket being held by two of the legs 6. It will be appreciated, however, that any suitable supporting means for the reflector may be employed. The mouth of this parabolic reflector opens upwardly and, preferably, this mouth is in a horizontal plane below that of the plate 5. The opening of the tube 16 is at approximately the focus of the parabolic reflector, with the result that the sound waves issue vertically from the latter undistorted and in parallel lines, and spread with equal and great volume in all directions.

It has been found that, with a parabolic reflector against which the sound waves are delivered by a tube the opening of which is positioned at approximately the focus of said parabolic reflector, an increased volume of sound is secured; and that, by arranging said reflector with its mouth pointing upwardly, said increased volume of sound will be delivered uniformly in all directions.

I am well aware that it has been heretofore proposed to provide a parabolic reflector with the end of a tone tube at or near its focus, and I do not therefore claim such a construction broadly. However, by my invention I have provided a novel arrangement of parts having important advantages. In a graphophone of the disk type the tone arm is vertically pivoted at one side of the turn-table and, when simplicity and compactness are desired, the sound amplifying or reflecting devices must be located close to the axis of vertical pivoting. In my improved construction, there is provided a short vertical tone tube having its axis coincident with the axis of pivoting, and the upward opening parabolic reflector is arranged with its axis coinciding with the axis of pivoting and with the axis of the tone tube. In this way the maximum of compactness is attained. With this arrangement it is not even necessary to carry the main parts of the frame outward to the tone



5 tube and the reflector, and these parts can be positioned outside of the outline of the frame and out of vertical register with the main frame board which supports the turn-  
 10 table, the motor and other parts. Preferably as shown, the main frame elements are provided with one extension 9 for carrying the tone tube and the pivot for the tone arm and with another independent extension 20  
 15 for carrying the parabolic reflector.

While, for the purpose of illustration, one expression of the inventive idea has been herein shown and described in detail, it is to be understood that the invention is not to  
 20 be limited to the construction shown, but that the inventive idea is susceptible of various mechanical expressions within the limits of the claims hereto appended.

What is claimed is:—

20 1. In a graphophone, the combination of a tone arm adapted to carry a sound box at one end and provided at the other end with a downward directed elbow about the vertical axis of which it is free to swing, a non-  
 25 rotary vertical tone tube communicating at its upper end with the said tone arm elbow and having its axis coincident with the said axis of swinging, and a parabolic reflector having its axis vertical and coincident with  
 30 the aforesaid axes and having its focus at the lower end of the tube and its upper edge considerably above the lower end of the tube.

35 2. In a graphophone, the combination of a tone arm adapted to carry a sound box at one end and provided at the other end with a downward directed elbow, a support for the elbow permitting movement about a vertical axis but holding it against other move-  
 40 ments, a non-rotary vertical tone tube communicating at its upper end with the said tone arm elbow and having its axis coincident with the said axis of swinging, and a parabolic reflector having its axis vertical  
 45 and coincident with the aforesaid axes and having its focus at the lower end of the

tube and its upper edge considerably above the lower end of the tube.

3. In a graphophone, the combination of a motor board, a turn-table on the board, 50  
 mechanism including a motor for driving the turn-table mounted beneath the board, supporting means for the board and the devices attached thereto, an upward opening  
 55 parabolic reflector rigidly connected with the said supporting means and board and positioned with its axis vertical and out of vertical register with any part of the supporting means and motor board, a non-rotary vertical tone tube terminating at its  
 60 lower end at the focus of the reflector, and a tone arm adapted to carry a sound-box at one end and provided at the other end with a downward directed elbow having a vertical pivotal axis coincident with the axes of  
 65 the reflector and tone tube.

4. In a graphophone, the combination of a motor board, an ear extending horizontally from the board, a vertical tube secured to the ear, a tone arm connected with the tube  
 70 at the upper end thereof, a parabolic reflector having its axis vertical and having its focus at the lower end of the tube, and means independent of the said tube and ear for supporting the reflector. 75

5. In a graphophone, the combination of a motor board, legs for supporting the motor board, a vertical tube, means for supporting the tube from the board, a tone arm connected with the tube at the upper end  
 80 thereof, a parabolic reflector having its axis vertical and having its focus at the lower end of the tube, and means carried by the legs independently of the board for supporting the reflector. 85

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,

JOHN S. GRIFFITH.



SUPPORT FOR TALKING MACHINE RECORDS,  
# 1,163,566-----L. K. Scotford,  
Patented-December 7th, 1915.  
Filed-February 7th, 1914.

L. K. SCOTFORD.  
SUPPORT FOR TALKING MACHINE RECORDS.  
APPLICATION FILED FEB. 7, 1914.

1,163,566.

Patented Dec. 7, 1915.

Fig. 1.

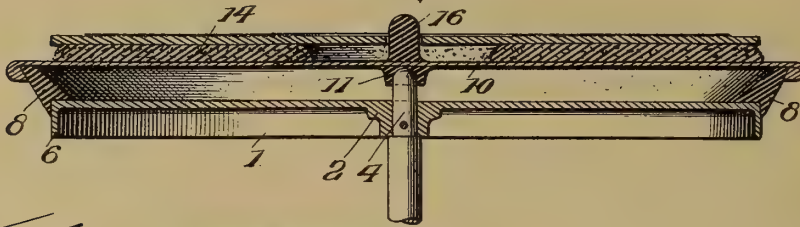


Fig. 2.

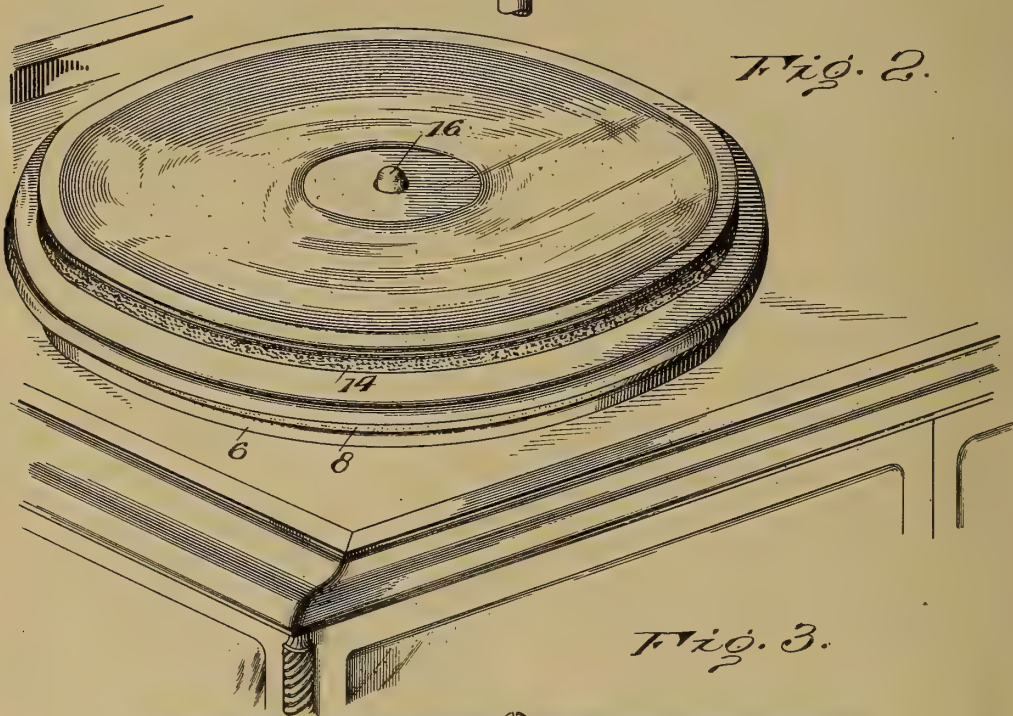


Fig. 3.

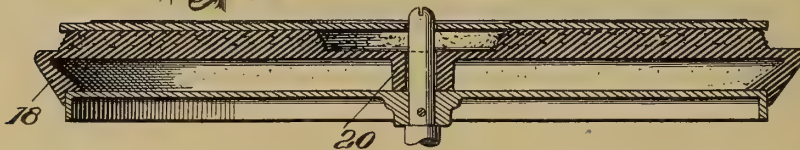


Fig. 4.

Witnesses  
W. A. Williams.  
H. S. Imrie

36 32 34 38 36 38

Inventor  
Louis K. Scotford

By  
Robertson Johnson  
Attorneys

# UNITED STATES PATENT OFFICE.

LOUIS K. SCOTTFORD, OF CHICAGO, ILLINOIS.

SUPPORT FOR TALKING-MACHINE RECORDS.

1,163,566.

Specification of Letters Patent. *Patented Dec. 7, 1915.*

Application filed February 7, 1914. Serial No. 817,210.

*To all whom it may concern:*

Be it known that I, LOUIS K. SCOTTFORD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Supports for Talking-Machine Records, of which the following is a specification.

This invention relates to turn-tables, or rather to cushioning supports to be secured to turn-tables of ordinary talking machines. It is known that a disk record gives out sounds and it has therefore been suggested that the disk record may be used without a sound box.

It is the object of my invention to overcome as far as possible the disk giving out the sounds referred to, except through the proper channel, *i. e.*, the sound box.

I am aware that it has been proposed to provide the turn-table of a talking machine with a rubber covering having nibs or projections under the playing portion of the record. But when any cushion is provided which leaves an air space under the playing part of the record, even though that record may be supported at a number of different points, there is a hollow sound due to the fact that there are some points of the record, opposite the needle, where there is no direct support. I have discovered that the use of sponge rubber, particularly when this rubber is secured to a fabric stretched over the revolving disk, overcomes to a large extent the objections above referred to and also that the objections are in a measure overcome by a cushion of rubber stretched or suspended across the turn-table so as to support the disk record under the whole part thereof opposite the playing part of the record.

In one of the preferred embodiments of my invention, I obtain excellent results by stretching a fabric over the revolving disk with the sponge rubber on the fabric so formed as to contact with the back or under portion of the record opposite the needle. This construction provides a soft yielding bed on which to lay the record while playing—a bed that will not be rigid, but which will allow the record to “give” more or less freely.

While I have just described in general terms one of the preferable embodiments of my invention, I do not limit my claims thereto, but the invention consists in the con-

struction and arrangement of parts as herein described and definitely claimed.

In the accompanying drawings: Figure 1 is a sectional view of a turn-table having my invention applied thereto. Fig. 2 is a perspective view. Figs. 3 and 4 are sectional views of modified forms.

Referring now to the details of the drawings by numerals: 1 designates a turn-table as now commonly employed in talking machines and which is usually supported by an annular portion 2 projecting over the usual detachable axis 4 by which the turn-table is secured to the revolving member (not shown) usually driven by the spring motor of the machine. In the usual form in which the turn-tables are made, the turn-tables are provided with an annular flange 6 projecting downward from the periphery of the turn-table and in the preferred embodiment of my invention, I place over the turn-table 1 at its periphery a ring 8 formed with a recess to fit over the right angle formed by the flange 6 and the upper surface of the turn-table 1. This annular ring 8 is preferably formed of metal, although it could be formed of hard rubber or any other suitable substance.

My cushioned support in one of its preferred constructions consists of a piece of fabric, as 10, stretched over the turn-table and supported by the aforesaid ring 8; the fabric 10 having secured thereto a cushion of sponge rubber 14 which extends under the playing part of the record. If desired the sponge rubber cushion may be slightly rounded so that the weight of the record will flatten the cushion out and the record thereby be supported under the entire playing part. At the center may be secured a hub 11 extending downwardly to fit upon the ordinary center pin 4, and above this hub there may be a steadying pin 16 sufficiently high to project through the record on the cushioning support in the same manner as the records have usually been centered by the ordinary center pin 4.

Instead of employing the construction shown in Figs. 1 and 2, the ring 8 may be dispensed with and the device made entirely of rubber, in which event the rubber cushion will be provided with an annular member 18 to take the place of ring 8 in Fig. 1. Likewise, instead of having the center construction shown in Fig. 1, the cushion may be provided with a member 20 to fit over the center



pin, in which case the ordinary center pin would have to be replaced by one sufficiently high not only to pass through the support but also pass through the record projecting therefrom, (see Fig. 3).

Another modification is shown in Fig. 4 where, instead of using a stretched sheet of fabric with deadening cushions, I may stretch a rubber cushion 32 on an auxiliary supporting disk 34, said disk having an upturned periphery 36 over which projects an annular flange 38 formed on the under side of the rubber cushion 32. In this case, as well as the others, there is no air space between the playing part of the record and the rubber cushion.

By the use of the constructions shown, I am enabled to provide a cushioning support for talking machine records which not only eliminates to a considerable extent the scratch of the needle, but at the same time changes the tone and benefits the reproduction of the music from the record. The cushioning support provides a yielding bed on which the disk record rests during playing which not only is not rigid, but which will permit the record to "give" more or less freely.

I do not limit my invention to the preferred embodiments described, but would refer to the appended claims to indicate the scope of the invention.

What I claim as my invention is:

1. As a new article of manufacture, a support for talking machine records comprising a member adapted to rest upon the turn table of a talking machine and having a record support suspended across the same and forming a cushioning rest for the record.

2. As a new article of manufacture, a support for talking machine records comprising a device adapted to revolve around the axis of a talking machine, and a member suspended across said device and forming a cushioning rest for the record.

3. As a new article of manufacture, a support for talking machine records comprising a device adapted to rest upon an ordinary turn-table of a talking machine, and a member suspended across said device thus forming a cushioning rest for the record.

4. As a new article of manufacture, a support for talking machine records comprising a member adapted to be suspended across a revolving part of a talking machine to form

a cushioning rest for the record and having a downwardly projecting flange at its periphery and a steadying pin at its center.

5. As a new article of manufacture, a support for talking machine records comprising a member adapted to be suspended across a revolving part of a talking machine to form a cushioning rest for the record and having a downwardly projecting flange at its periphery.

6. As a new article of manufacture, a support for talking machine records comprising a device adapted to rest upon the turn table of a talking machine, and a member stretched across said device and forming a cushioning rest for the record, said member having a thickened portion to support the part of the disk in which the record is formed.

7. As a new article of manufacture, a support for talking machine records comprising a device adapted to rest upon the turn table of a talking machine and a member composed of sponge rubber suspended across said device and forming a cushioning rest for the record.

8. As a new article of manufacture, a support for talking machine records comprising a device adapted to revolve around the axis of a talking machine and a member composed of rubber suspended across said device and forming a cushioning rest for the record, said member having a thickened portion of sponge rubber to support that part of the record in which the record is formed.

9. As a new article of manufacture, a support for talking machine records comprising a member formed of sponge rubber adapted to be suspended across the revolving part of a talking machine and forming a cushioning rest for the record.

10. As a new article of manufacture, a support for talking machine records comprising a member formed of sponge rubber adapted to be suspended across a revolving part of a talking machine and forming a cushioning rest for the record, and having a thickened portion to support that part of the disk in which the record is formed.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS K. SCOTFORD.

Witnesses:

GEO. A. McGRUFF,  
F. M. BIELENBERG.

NEEDLE FOR TALKING MACHINES AND METHOD OF  
MAKING THE SAME,

# 1,163,567-----L. K. Scotford,  
Patented-December 7th, 1915.  
Filed-March 28, 1914.

L. K. SCOTFORD.  
 NEEDLE FOR TALKING MACHINES AND METHOD OF MAKING THE SAME.  
 APPLICATION FILED MAR. 28, 1914.

1,163,567.

Patented Dec. 7, 1915.

Fig. 1.

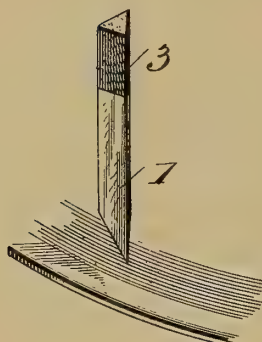


Fig. 2.



Fig. 4.

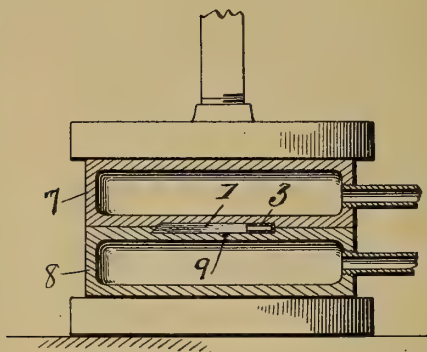


Fig. 3.



Witnesses  
 W. A. Williams.  
 R. W. Brown

Inventor  
 Louis K. Scotford  
 By Roberton Johnson  
 Attorneys



# UNITED STATES PATENT OFFICE.

LOUIS K. SCOTFORD, OF CHICAGO, ILLINOIS.

NEEDLE FOR TALKING-MACHINES AND METHOD OF MAKING THE SAME.

1,163,567.

Specification of Letters Patent.

Patented Dec. 7, 1915.

Application filed March 28, 1914. Serial No. 827,951.

*To all whom it may concern:*

Be it known that I, LOUIS K. SCOTFORD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Needles for Talking-Machines and Methods of Making the Same, of which the following is a specification.

10 This invention relates to improvements in needles for use in talking machines and method of making the same.

The object of the invention is to produce a needle which will eliminate the scratching and hissing noise so common in records that have been used for some time.

The invention consists of a needle formed of any desirable substance, such as the ordinary steel or fiber needle, with its shank coated with a deadening substance such, for example, as rubber, and in the preferred embodiment, the needle proper is formed of fiber which is compressed under heat in the act of vulcanizing the rubber to the shank.

25 In the drawings accompanying and forming part hereof: Figure 1 is a perspective view of a fiber needle made in accordance with my invention. Fig. 2 is a vertical section of the same. Fig. 3 is a view of a steel needle having its shank covered with rubber, and Fig. 4 is a diagrammatic view illustrating a vulcanizing press in which the needle may be formed.

Referring now to the details of the drawings by numerals: 1 designates a needle which may be made of the same substance as the ordinary fiber needle now so commonly used. In its preferred embodiment this needle has its shank 2 of smaller size than the needle proper and to this shank is vulcanized a deadening substance consisting of a coating of rubber 3. In lieu of using a fiber needle I may employ an ordinary steel needle 4, such as those now in use, to the shank of which may be vulcanized a deadening substance 5.

In the most desirable form of my invention the fiber needle is compressed under heat in the act of vulcanization. Fig. 4 shows a diagrammatic view of a press in

which the needle may be vulcanized, although it will be understood of course that in the actual press a number of needles may be vulcanized simultaneously. This vulcanizing press may be formed of two steel molds 55 7 and 8 between which is formed a triangular recess 9 to receive a needle a little larger than the triangular recess so that when the press is put under hydraulic pressure the needle is compressed into smaller space while 60 vulcanization is obtained and the fiber is thoroughly dried and hardened. It will be noted that in vulcanizing the deadening substance to the shank I not only accomplish the vulcanization but also derive the beneficial effect due to reducing the size of the fiber and thereby compressing the same under considerable heat. Ordinarily 400° of heat is sufficient for the purpose.

By the use of needles as herein described, 70 I virtually eliminate the scratching and hissing noise from talking machines. On some records the noise is entirely eliminated while with some particularly loud buzzy records, the scratching is greatly decreased. 75

I am aware that it has been proposed to use deadening substance in the sound boxes of talking machines but believe I am the first to produce a needle having its own individual deadening surface. 80

What I claim as my invention is:

1. As an article of manufacture, a needle for talking machines comprising the needle proper having a deadening substance as rubber vulcanized to its shank. 85

2. As an article of manufacture, a needle for talking machines comprising a body of compressed fiber having a deadening substance as rubber vulcanized to its shank.

3. The method of making a needle comprising the steps of providing the needle with a covering of rubber, and subjecting it to heat and pressure whereby the needle is compressed and the rubber vulcanized. 90

In testimony whereof I affix my signature 95 in presence of two witnesses.

LOUIS K. SCOTFORD.

Witnesses:

F. M. BIELEBERG,

CHAS. A. LENDELMER.

# THE JOURNAL OF THE

ROYAL SOCIETY OF MEDICINE

Volume 10, Part 1, 1916

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**DESIGN.**

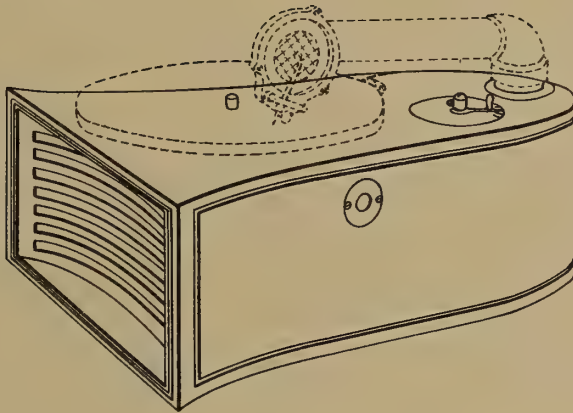
P. HUNT.

PHONOGRAPH CASING.

APPLICATION FILED MAR. 23, 1915.

48,249.

Patented Dec. 7, 1915.



*Witnesses:*

*Ernest C. Telfer*

*Inventor*

*Paul Hunt*

*by W. Harrison*  
*Atty.*





# UNITED STATES PATENT OFFICE.

PAUL HUNT, OF BROOKLINE, MASSACHUSETTS.

DESIGN FOR A PHONOGRAPH-CASING.

48,249.

Specification for Design.

Patented Dec. 7, 1915.

Application filed March 23, 1915. Serial No. 16,497. Term of patent 7 years.

*To all whom it may concern:*

Be it known that I, PAUL HUNT, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented a new, original, and ornamental Design for Phonograph-Casings, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The figure is a perspective view of a phonograph, showing my new design.

I claim:

The ornamental design for a phonograph casing, as shown.

PAUL HUNT.

Witnesses:

GEORGE A. ROCKWELL,

E. GLENESKIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





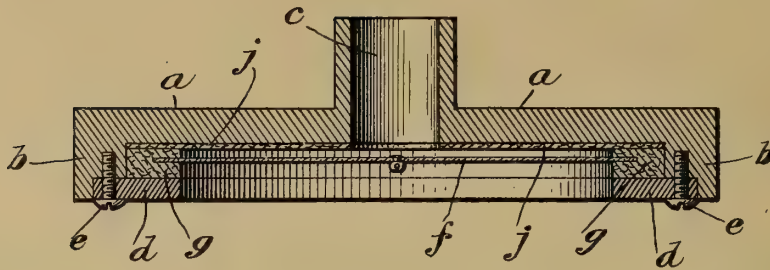
SOUND BOX FOR PHONOGRAPHS,  
# 1,163,854-----C. B. Repp,  
Patented-December 14, 1915.  
Filed-January 19, 1912.

C. B. REPP.  
SOUND BOX FOR PHONOGRAPHS.  
APPLICATION FILED JAN. 19, 1912.

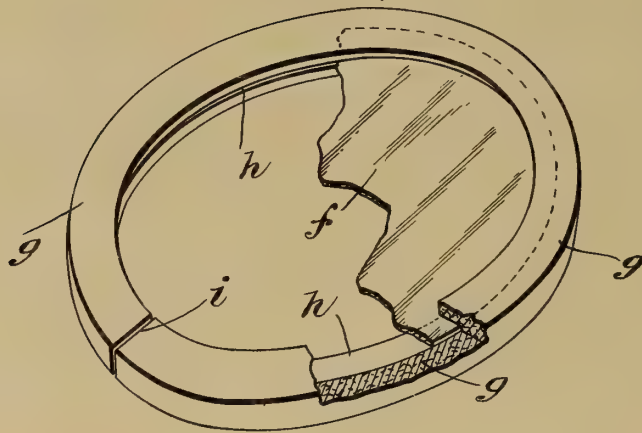
1,163,854.

Patented Dec. 14, 1915.

*Fig. 1.*



*Fig. 2.*



Attest:  
*E. M. Miller*  
Eugene Werning.

*C. B. Repp* Inventor:  
by *Chas. J. Wentworth*  
his Atty.

# UNITED STATES PATENT OFFICE.

CLINTON B. REPP, OF NEW YORK, N. Y.

## SOUND-BOX FOR PHONOGRAPHS.

1,163,854.

Specification of Letters Patent. Patented Dec. 14, 1915.

Application filed January 19, 1912. Serial No. 672,066.

*To all whom it may concern:*

Be it known that I, CLINTON B. REPP, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Sound-Boxes for Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to sound boxes for phonographs, and more particularly to the means for insulating the sound box casing so as to exclude the vibrations developed in the diaphragm therefrom.

The main object of the invention is to provide a sound box wherein the edges of the diaphragm will be firmly clamped in position through a medium which will absorb any vibrations passing thereto, which will be weather proof and not susceptible to climatic changes, and which will not deteriorate rapidly through aging.

A further object is to provide a structure of this character wherein the edges of the diaphragm will be completely inclosed by the vibration absorbent body so as to eliminate any possibility of vibrations passing to the metallic portions of the sound box.

A still further object is to provide in a sound box a uni-structural gasket supporting the diaphragm which will have a normal tendency to close upon the edge of the diaphragm, thus simplifying its application to the sound box. And a still further object is to provide a sound box wherein the metallic portions within the sound box will be sheathed by a resilient body to prevent the development of sound vibrations in the metallic portions of the sound box adjacent to the sound outlet opening.

The invention consists primarily in a sound box for phonographs, embodying therein a casing having a sound outlet opening therein, a diaphragm, and a cork gasket supporting the edge of said diaphragm, said gasket having oppositely disposed portions adapted to be clamped upon said diaphragm, and means clamping said gasket upon the edge of said diaphragm; and in such other novel features of construction, and combination of parts, as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings: Figure 1 is a

transverse section of a sound box embodying my invention; and Fig. 2 is a detail view in perspective of the packing gasket with the diaphragm therein, said diaphragm being broken away, and said gasket being partly broken away.

Like letters refer to like parts in both of said views.

In sound boxes now commonly used in phonographs, the diaphragm is mounted in a metallic sound box, by means of oppositely disposed annular tubular gaskets. While this construction has been found to be capable of good results, it possesses objectionable features such as the susceptibility of the gaskets to a loss of their resiliency through a loss of life in the rubber of which they are made, the susceptibility to rapid deterioration through climatic changes as in machines exported to tropical countries, and the exposure of the ends of the diaphragm between the gaskets to the metallic flange of the sound box, thus in some instances permitting the transmission of vibrations to the sound box as a result of this exposure.

As a result of extensive experiments in endeavoring to discover a construction of sound box and the supporting gaskets incidental thereto which will not possess these objectionable characteristics, I have ascertained that high efficiency may be secured by the use of cork gaskets and that such gaskets not only possess a degree of resiliency necessary to prevent the transmission of vibrations thereby to the metallic portions of the sound box, but may be readily compressed about the edge of the diaphragm to firmly secure it in place, and are not affected by climatic conditions to an extent to cause any material loss of efficiency by reason thereof.

In the embodiment of my invention shown in the accompanying drawings, *a* indicates an ordinary metallic sound box having a pendant edge *b* and a sound outlet opening *c*. Seated within the sound box and secured therein by means of the packing gasket and the annular clamp ring *d*, held in place by the screws *e*, is a diaphragm *f*.

In practice, I have found the form of gasket shown in the drawings to be the most effective in use as securely holding the diaphragm in position while facilitating its application to the sound box. This gasket comprises a split ring *g* of cork, having upon the inner surface thereof a channel *h*



adapted to receive the edge of the diaphragm. I split this ring at one point as at *i*, so that the ring may be expanded to an extent to permit the diaphragm to be readily inserted within same.

The channel *h* is of a depth to receive and completely extend over the edge of the diaphragm so that when the diaphragm is in place in the sound box, the edge and adjacent to the edge of said diaphragm will be completely inclosed, thus causing any vibrations passing thereto from said diaphragm to be absorbed by the resilient packing afforded by the cork gasket *g* and at the same time interposing a vibration absorbing body between the diaphragm and the edge *b*.

In my experiments, I have determined that when a phonograph is in operation, the metal of the sound box is itself in vibration, and that these vibrations may be conveyed therefrom and converted into sound waves. Inasmuch as the only portion of the sound box which could transmit vibrations to the metallic portions thereof is the diaphragm, and as the only portion of the diaphragm exposed to the metallic portions of the sound box was the edge thereof, I believe that the insulation of this edge by means of a resilient packing will secure the desired result of preventing the vibrations of the diaphragm from being transmitted to the metallic portions of the sound box and thus confine the sound vibrations to this diaphragm and to those passing through the sound outlet opening *e*. To further guard against the development of sound vibrations in the metallic portions of the box, I prefer to line the interior of the top of the box about the sound outlet opening with a resilient sheathing such as the cork disk *j*, so that the sound vibrations due to the displacement of air within the sound box will be projected by the diaphragm against this resilient sheathing which will not transmit them to the metallic portions of the box.

In mounting the diaphragm in the sound box, the sheathing *j* is first secured within the sound box with the opening therein in register with the sound outlet opening *e*. The ends of the packing ring *g* at the cut *i* are then spread apart and the diaphragm *f* slipped through the enlarged opening thus formed and its edges inserted in the channel *h*. When the diaphragm is in place, the resiliency inherent to the ring *g* will close the said ring upon the diaphragm, thus presenting a unitary structure embodying the entire packing gasket and the diaphragm which may be inserted in the sound box and secured in place by the clamp ring *d*, the desired pressure being developed by means of the screws *e*. This gasket being impervious to moisture, and not susceptible to deterioration through changes of temperature,

the adjustment of the diaphragm when once effected, becomes permanent and the quality of the tone production will be unimpaired by the ordinary conditions of use. The arrangement of the packing is such as to absorb all vibrations passing thereto from the diaphragm, thus insulating the sound box proper *a* from such vibrations. The sheathing *j* will serve, as stated, to protect the metallic portions of the sound box from the sound vibrations developed through the vibrations of the diaphragm, and thus prevent the development of vibrations in the metal of the sound box.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described my invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A sound box for phonographs embodying therein a casing having a sound outlet opening therein, a diaphragm, the plane of which is perpendicular to the axis of said sound outlet opening, a cork gasket formed as a split annulus with the ends thereof abutting whereby said gasket may be enlarged by separating said ends to permit the insertion of said diaphragm therein, said gasket having parallel plane surfaces and a slot extending partly therethrough intermediate said surfaces and opening within the inner periphery thereof whereby a portion of said diaphragm adjacent the entire periphery thereof will be inclosed by said gasket and a portion of said gasket will be interposed between the edge of the diaphragm and said casing and a clamp ring acting upon one entire surface of said gasket whereby the entire portion of the diaphragm adjacent the edge thereof and seated in said slot is subjected to substantially uniform pressure and is gripped firmly by said gasket.

2. A sound box for phonographs embodying therein a metallic circular casing having a sound outlet opening extending axially thereof, an annular vibration absorbent body within said casing about said sound outlet opening, a diaphragm, the plane of which is perpendicular to the axis of said opening, a cork gasket formed as a split annulus with the ends thereof abutting whereby said gasket may be enlarged by separating said ends to permit the insertion of said diaphragm therein, said gasket having parallel plane surfaces and a slot extending partly therethrough intermediate said surfaces and opening within the inner periphery thereof whereby a portion of said diaphragm adjacent the entire periphery thereof will be inclosed by said gasket and a portion of said

gasket will be interposed between the edge of the diaphragm and said casing, said gasket bearing upon said vibration absorbent lining and a clamp ring acting upon one entire surface of said gasket whereby the entire portion of the diaphragm adjacent the edge thereof and seated in said slot is subjected to substantially uniform pressure and is gripped firmly by said gasket.

In witness whereof, I have hereunto affixed my signature, in the presence of two subscribing witnesses, this 8th day of January, 1912.

CLINTON B. REPP.

Witnesses:

FRANK T. WENTWORTH,  
EUGENE WENING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The second part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The third part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The fourth part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The fifth part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The sixth part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The seventh part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The eighth part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The ninth part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science. The tenth part of the paper is devoted to a detailed discussion of the problem of the origin of life. It is shown that the problem is one of the most important and most difficult in the history of science.



COMBINED PIANO PLAYER AND  
PHONOGRAPH,

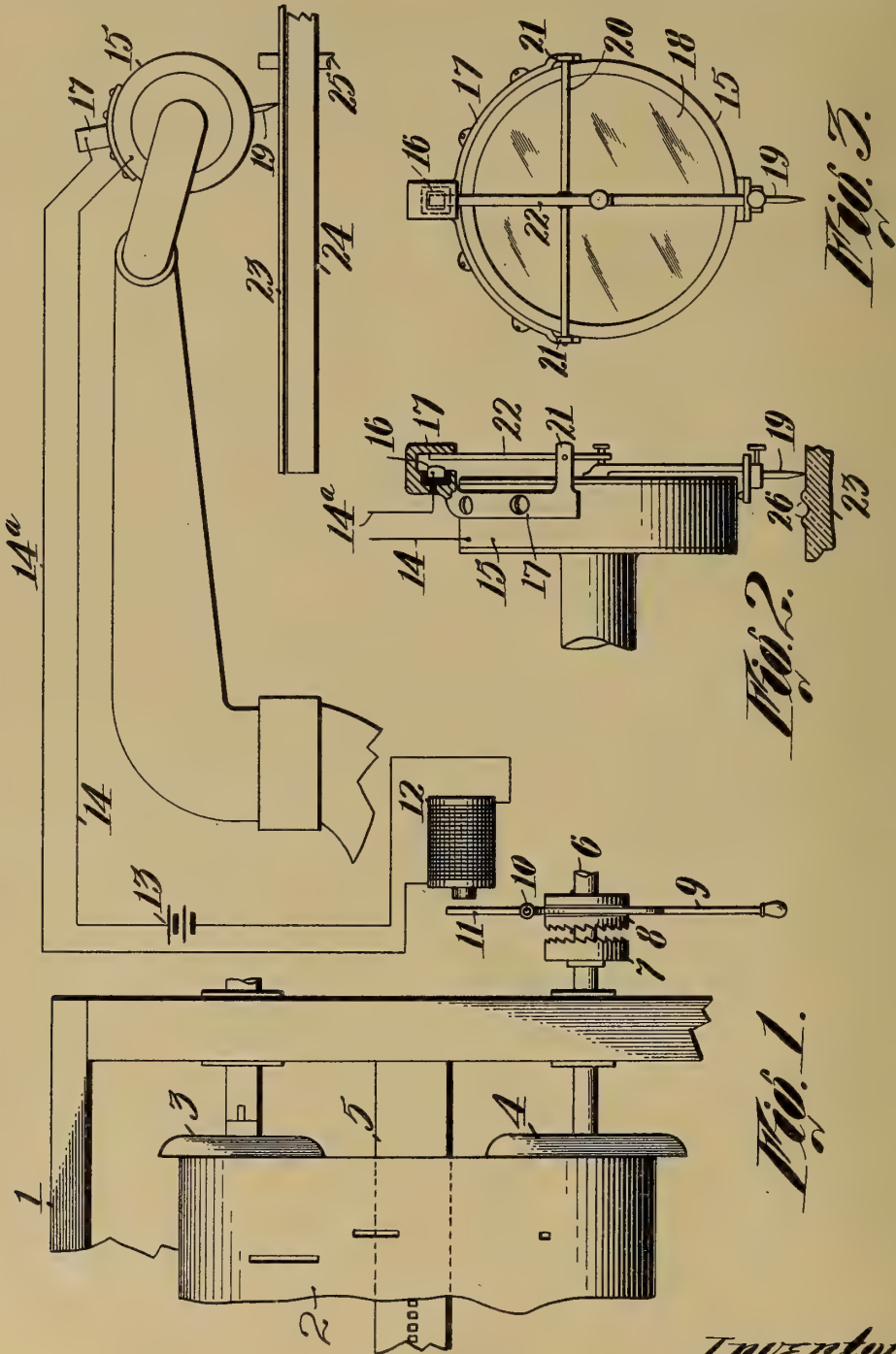
# 1,164,265-----W. M. Davis,  
Patented-Dec. 14, 1915,  
Filed-November 18, 1913.

COMBINED PIANO PLAYER AND PHONOGRAPH.

APPLICATION FILED NOV. 18, 1913.

**1,164,265.**

Patented Dec. 14, 1915.



*Witnesses:*

C. F. Wesson.  
E. M. Allen.

*Inventor:*  
*W. M. Davis.*  
*By Attorneys.*  
*te + Southgate*

# UNITED STATES PATENT OFFICE.

WALTER M. DAVIS, OF PARIS, FRANCE.

COMBINED PIANO-PLAYER AND PHONOGRAPH.

1,164,265.

Specification of Letters Patent.

Patented Dec. 14, 1915.

Application filed November 18, 1913. Serial No. 801,742.

*To all whom it may concern:*

Be it known that I, WALTER M. DAVIS, a citizen of the United States, temporarily residing at Paris, France, have invented a new and useful Combined Piano-Player and Phonograph, of which the following is a specification.

This invention relates to a combined piano player and phonograph, and particularly to devices for starting the player record in predetermined relation to the phonographic record.

In my prior Patent No. 958,730, dated May 24, 1910, I have shown means for producing a record of a vocal or other selection upon the disk or record-receiving element of a phonograph, and for simultaneously producing a record of the piano accompaniment thereof upon the record-sheet of a piano player. Having secured these simultaneous records it is evident that means must be provided for starting the record of the accompaniment upon the player in predetermined relation to the record of the selection upon the phonograph. In my prior Patents Nos. 958,731 and 1,013,589, dated May 24, 1910, and Jan. 2, 1912, respectively, I have shown devices for starting the records in such predetermined relation, these devices comprising a separable connection in the driving mechanism of the piano player and electro-magnetic means for closing this connection, said means being controlled by a contact piece inserted in the phonograph record. When this contact piece came into relation with the metallic needle or stylus of the phonograph a circuit was closed which operated through the magnet to connect the driving mechanism to the piano player.

It is the object of my present invention to improve upon the devices shown in my prior patents, and to provide electrical means for controlling the operation of the driving mechanism of the piano player which shall still be controlled by the phonographic record, but which shall not involve the addition of special electrical contacts and connections thereto.

Accordingly my invention contemplates the provision of electro-magnetic connections controlled by the vibration of the stylus of the phonograph for starting the player sheet in predetermined relation to the vocal or other selection upon the phonograph.

My invention further comprises certain devices, arrangements and combinations of

parts which will be hereinafter described and more fully set forth in the appended claims.

A preferred form of my invention is shown in the drawings, in which—

Figure 1 is a side elevation showing a portion of a piano player, a portion of a phonograph, and the controlling devices for starting the player; and Figs. 2 and 3 are side and front views respectively of the sound box of the phonograph showing the means by which the electro-magnetic circuit is controlled.

In the drawings the record box of a piano player is indicated at 1, within which the record sheet 2 is mounted upon the spools 3 and 4, and is thereby caused to travel over the tracker-bar 5. The spool 4 is separably connected with a driving shaft 6 by any suitable means, such as the clutch members 7 and 8. The movable clutch 8 is conventionally controlled by the lever 9 pivoted at 10, and having secured thereto the armature 11.

An electro-magnet 12 is mounted in proximity to the armature 11 and is connected with any suitable source of electricity, such as the battery 13. In the circuit comprising the magnet 12 and the battery 13 is included a wire 14 which connects one terminal of the magnet coil to any convenient metallic portion of the sound box 15. The other terminal of the magnet coil is connected by a wire 14<sup>a</sup> to a contact piece 16 (Fig. 2,) which is mounted upon a bracket 17 secured to the sound box of the phonograph, the battery 13 being inserted at any convenient point in either of the conductors 14 or 14<sup>a</sup>. The conductor 14<sup>a</sup> and the contact-piece 16 are electrically insulated from the bracket 17 and the sound box 15.

Secured to the sound box is the usual diaphragm 18 which is acted upon by any suitable vibrating needle or stylus 19. A shaft extends across the face of the sound box (Fig. 3) and is mounted in pivotal bearings 21 secured to said box. This shaft supports an arm 22, one end of which extends downwardly and contacts with the needle supporting mechanism while the upper end normally rests against a depending projection of the bracket 17.

Any usual form of phonographic record 23 is mounted upon a support 24 secured to a driving shaft 25. Driving means, not shown, is so connected to the shafts 6 and 25 that



the phonographic record and the player sheet will move at predetermined relative speeds. Any suitable driving means may be used, one form of such mechanism being  
5 shown in my prior Patent 958,731.

The normal or inoperative position of the parts is shown in Figs. 1 and 2, in which position the record-sheet should be adjusted so that the perforations corresponding to the  
10 first notes of the accompaniment will be situated just above the openings in the tracker-bar, the clutch members 7 and 8 are separated, and the needle 19 is placed at the beginning of the phonographic record.

It is customary in taking phonographic records to start the receiving element somewhat in advance of the beginning of the selection, and it is clear that the starting mechanism of the player device should be so actuated that movement shall be imparted to the  
20 record-sheet in timed relation to the actual commencement of the phonographic selection. With the parts in the position shown, the needle 19 will not be vibrated until the slight depressions or irregularities in the  
25 surface constituting the record reach the needle. When these depressions begin to vibrate the needle, the vibrations will be communicated to the arm 22 and will throw  
30 the upper end of the arm to the left, thereby closing the electro-magnetic circuit and throwing the movable clutch member 8 into engagement with the clutch member 7 to start the player mechanism.

It is sometimes desirable to start the player record somewhat before the beginning of the phonographic selection, and this result may be attained by providing special depressions or protuberances upon the record disk in  
40 advance of the record itself. Such irregularities in the disk are indicated in exaggerated form at 26 in Fig. 2.

Having thus described my invention, it is obvious that many changes and modifications thereof can be made by one skilled in  
45 the art without departing from the spirit

and scope of my invention, and I do not wish to be limited to the details herein disclosed, but

What I claim is:—

1. The combination of a piano player and a phonograph, means for driving them at predetermined relative speeds, and electrically actuated means controlled by the phonograph record for starting the player, said  
55 latter means comprising a controlling magnet, and an operating circuit therefor, one terminal of said circuit being connected to a contact piece supported upon, but insulated from the phonograph sound box, and the  
60 other terminal being electrically connected to a conducting member forming a part of the operating circuit and pivotally supported upon the sound box, one end of said member being normally adjacent but out of  
65 contact with said contact piece, and the other end extending into the path of a vibrating element of the phonograph, the vibration thereof by the record moving the conducting member against the contact piece and closing  
70 the magnetic circuit to start the player.

2. The combination of a piano player and a phonograph, means for driving them at predetermined relative speeds and electrically actuated means controlled by the phonograph record for starting the piano player,  
75 said means comprising a controlling magnet and an operating circuit therefor, the closing of said circuit being controlled by a vibration of the stylus of the phonograph caused by certain surface irregularities  
80 definitely positioned upon the record disk, said stylus and disk forming no part of said electrical circuit.

In testimony whereof I have hereunto set  
85 my hand, in the presence of two subscribing witnesses.

WALTER M. DAVIS.

Witnesses:

HANSON C. COXE,  
JACK H. BAKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

METHOD OF AND APPARATUS FOR  
SYNCHRONOUSLY MAKING MOTION PICTURES AND SOUND  
RECORDS,

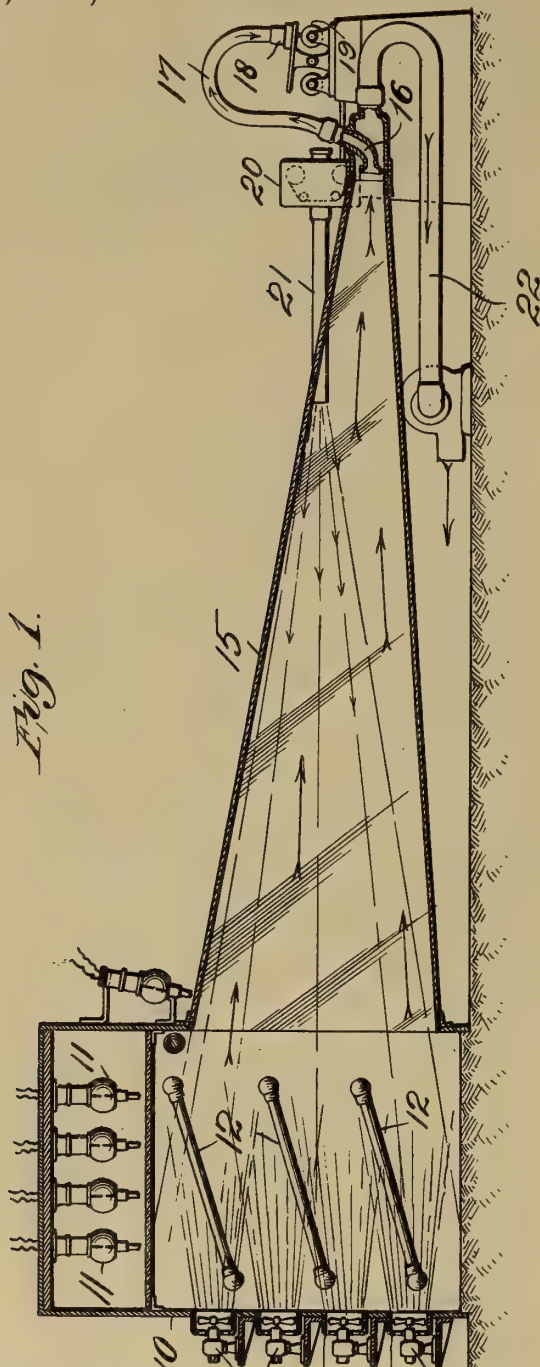
# 1,164,401-----D. O. Royster,  
Patented-Dec. 14, 1915.  
Filed-March 16, 1914.

D. O. ROYSTER.  
METHOD OF AND APPARATUS FOR SYNCHRONOUSLY MAKING MOTION PICTURES  
AND SOUND RECORDS.

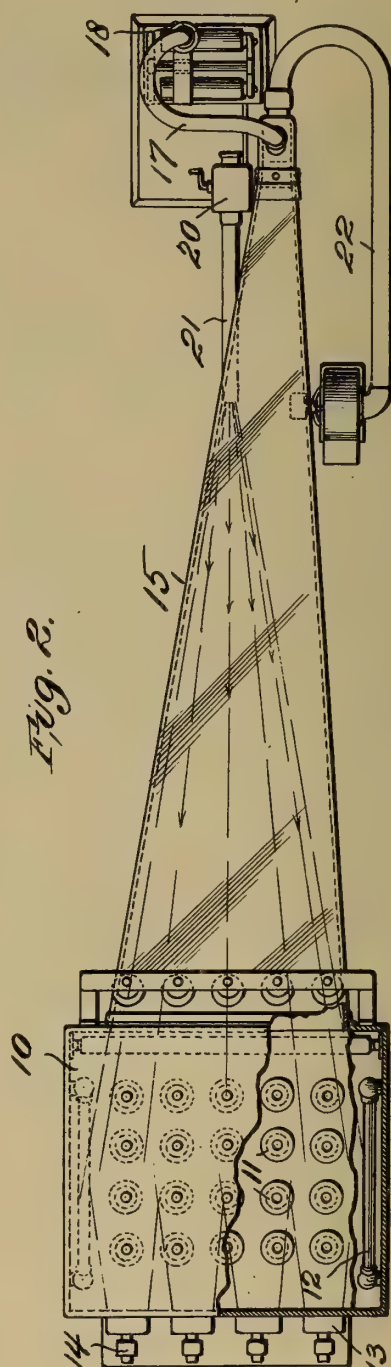
APPLICATION FILED MAR. 16, 1914.

1,164,401.

Patented Dec. 14, 1915.



Attest:  
*Wm. A. Ford*  
P. Q. Williams



Inventor:  
*David O. Royster*



# UNITED STATES PATENT OFFICE.

DAVID O. ROYSTER, OF ST. LOUIS, MISSOURI.

METHOD OF AND APPARATUS FOR SYNCHRONOUSLY MAKING MOTION-PICTURES AND SOUND-RECORDS.

1,164,401.

Specification of Letters Patent.

Patented Dec. 14, 1915.

Application filed March 16, 1914. Serial No. 824,895.

*To all whom it may concern:*

Be it known that I, DAVID O. ROYSTER, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Methods of and Apparatus for Synchronously Making Motion-Pictures and Sound-Records, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section taken lengthwise through the center of an apparatus of my improved construction. Fig. 2 is a plan view of the apparatus with a part thereof in horizontal section.

My invention relates to a new and improved method of and apparatus for synchronously making motion pictures and sound records, the principal object of my invention being to provide a comparatively simple and inexpensive apparatus which can be readily utilized for taking motion pictures and making sound records which when reproduced will be absolutely synchronous.

In taking motion pictures the object to be photographed is necessarily located a certain distance away from the camera and the methods heretofore practised for making records of the sounds produced by photographed objects have not always resulted in perfect synchronisms between the reproduced pictures and sounds, and in my improved method and apparatus, I propose to provide means wherein all the sounds made by an object which is being photographed will be drawn through a tapered chamber to a point of concentration, from whence they are delivered directly to the sound recording device, which latter is located adjacent to and operated synchronously with the motion picture camera.

With the above and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and claimed.

Referring by numerals to the accompanying drawings, 10 designates a housing which is adapted to be occupied by the object to be photographed and the interior of this housing is lighted in any suitable manner, preferably by means of a series of arc lamps 11, located in the upper portion of the housing

and also by means of mercury vapor lamps 12 located adjacent to the side walls of the housing.

Formed in the rear wall of the housing is a series of openings which are partially inclosed by small housings 13 and located in these small housings are small electric fans 14.

Connected to the front wall of the housing and projecting outwardly therefrom is one end of an elongated hollow cylinder 15 which tapers gradually toward its outer end, said cylinder being constructed of any desired material, but preferably of glass. Located in the small outer end of this tapered cylinder is a receiver 16 and leading therefrom is a tube 17 which connects with the recorder 18 of a sound recording device 19. Located immediately adjacent to this sound recording device and adapted to be operated synchronously therewith is a motion picture camera 20, the same having a tubular extension 21 which extends into the tapered cylinder 15 so that the lenses of said camera are focused upon the center of the housing 10. Leading from the small outer end of the cylinder 15 to a suitable suction producing device such as a fan is a tube 22.

In the operation of my improved apparatus, the camera 20 and sound recording device 19 are simultaneously operated and the object to be photographed occupies the housing 10. The fans 14 and suction producing device connected to tube 22 are simultaneously operated, thereby creating a flow of air through the housing 10, and through the tapered cylinder 15, which air finally passes through pipe 22 and discharges from the suction device connected thereto. The motions of the object within the housing 10 are photographically reproduced upon the film in the camera 20 and the sound waves produced by said object are carried through the cylinder 15, with the draft of air throughout, which sound waves are concentrated at the small outer end of the cylinder 15 where they are caught by the receiver 16 and transmitted to the reproducer 18 through tube 17. The recorder 18 acts directly upon the wax cylinder or disk of the sound recording device, and thus the sounds made by the object within the housing 10 are synchronously recorded with the pictures made by the camera 20.

By producing a current of air through the



housing 10 and cylinder 15 practically all the sounds made by the object within said housing are carried directly to the transmitter 16 and as the cylinder 15 is tapered toward its outer end these sounds are condensed so as to make a very clear and perfect record upon the cylinder or disk of the recording device 19.

An apparatus of my improved construction is comparatively simple, can be easily operated and provides means whereby motion pictures and sound records of absolute synchronism can be readily and cheaply produced.

If desired the housing 10 can be constructed of glass or other transparent material in order that pictures can be taken by natural light.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved apparatus can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. The hereindescribed method of synchronously making motion pictures and sound records, consisting in synchronously operating a motion picture camera and a sound recording device, focusing the camera on an object within a housing and transmitting the sounds made by the object within the housing by means of a current of air which is gradually condensed during its travel from the housing to the reproducer of the sound recording device.

2. The hereindescribed method of synchronously making motion pictures and sound records which consists in synchronously operating a motion picture camera and a sound recording device, focusing the camera on the object within a housing, forcing air into and through the housing, confining the air delivered to the housing, and conveying it to a point adjacent to the sound recording device and transmitting the sound waves carried by said air to the sound recording device.

3. In an apparatus of the class described, a housing, a cylinder connected thereto, which cylinder tapers toward its outer end, a motion picture camera and a sound recording device located adjacent to the outer end of the cylinder, a tubular connection from the outer end of the cylinder to the sound recording device, and means for creating a current of air through the housing and cylinder.

4. In an apparatus of the class described, an elongated cylinder which tapers from one end to the other, a motion picture camera and a sound recording device located adjacent to the small end of the cylinder, a connection from the cylinder to the reproducer

of the sound recording device, and means for producing a current of air through the tapered cylinder.

5. In an apparatus of the class described, an elongated cylinder which tapers from one end to the other, a motion picture camera and a sound recording device located adjacent to the small end of the cylinder, a connection from the cylinder to the reproducer of the sound recording device, means for producing a current of air through the tapered cylinder, and a housing located at the large end of said cylinder.

6. In an apparatus of the class described, an elongated cylinder which tapers from one end to the other, a motion picture camera and a sound recording device located adjacent to the small end of the cylinder, a connection from the cylinder to the reproducer of the sound recording device, means for producing a current of air through the tapered cylinder, a housing located at the large end of said cylinder, and means for lighting the interior of said housing.

7. The combination with a motion picture apparatus and a sound recording device which are adapted to operate synchronously, of an elongated tapered tube, the small end of which is connected to the reproducer of the sound recording device, and means for creating a current of air through said tapered tube.

8. The combination with a sound recording device, of an elongated tapered tube, the small end of which is connected to the reproducer of the sound recording device, means for creating a current of air through said tapered tube, a motion picture camera located adjacent to the sound recording device, and which camera and sound recording device are adapted to be operated synchronously.

9. In an apparatus of the class described, the combination with a motion picture machine and a phonograph, which are adapted to operate synchronously, of a housing adapted to receive objects upon which the picture machine is focused, a tube leading from said housing to the phonograph and means for forcing sound waves created within the housing through the tube toward the phonograph.

10. In an apparatus of the class described, the combination with a motion picture machine and a phonograph which are adapted to operate synchronously, of a housing adapted to receive objects upon which the picture machine is focused, a tube leading from said housing to the phonograph, means for artificially lighting the interior of the housing and means for forcing sound waves created within the housing through the tube toward the phonograph.

11. In an apparatus of the class described, the combination with a motion picture ma-

chine and a phonograph which are adapted to operate synchronously, of a housing adapted to receive objects upon which the picture machine is focused, a tube leading  
5 from said housing to the phonograph, and means for creating a current of air through the housing and tube toward the phonograph.

12. In an apparatus of the class described,  
17 the combination with a motion picture machine and a phonograph, which are adapted to operate synchronously, of a housing adapted to receive objects upon which the

picture machine is focused, a tube leading from said housing to the phonograph, 15 means for artificially lighting the interior of the housing, and means for creating a current of air through the housing and tube toward the phonograph.

In testimony whereof I hereunto affix my 20 signature, in the presence of two witnesses, this 12th day of March, 1914.

DAVID O. ROYSTER.

Witnesses:

WM. H. SCOTT,

A. B. LEWIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





TALKING MACHINE,

Reissue Number 14,035-----C.E.Woods,

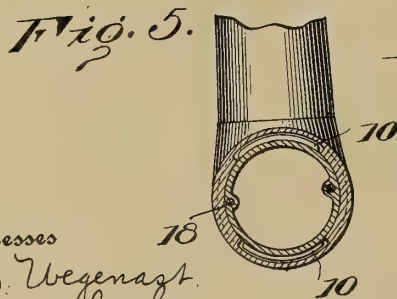
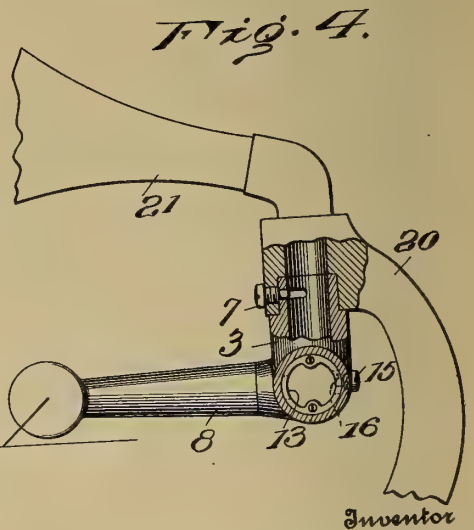
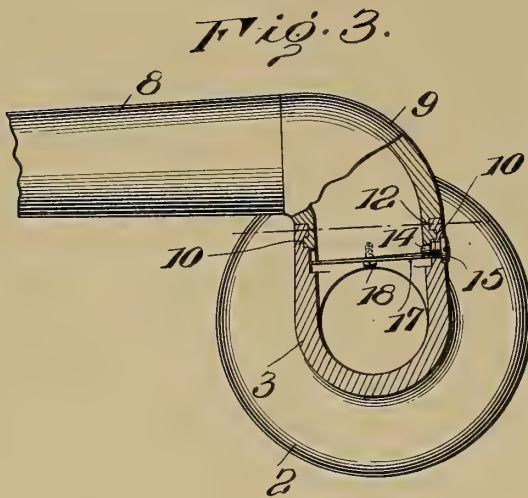
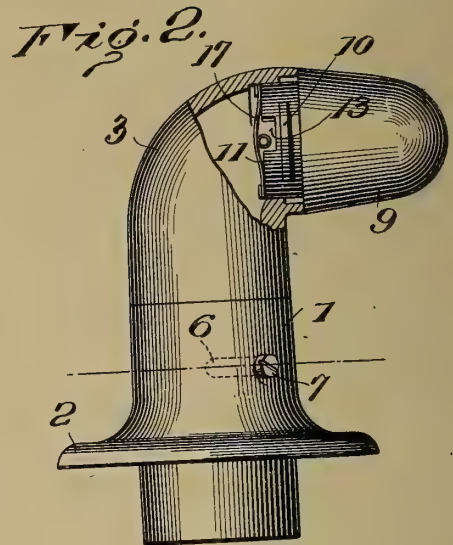
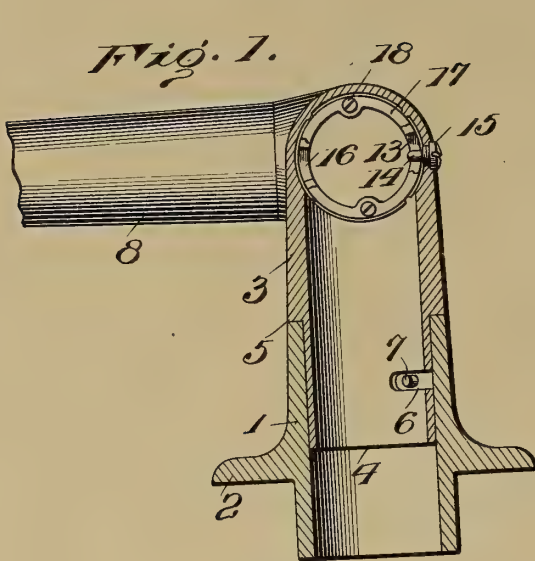
Patented-December 21, 1915.

Filed-December 3, 1914.

C. E. WOODS.  
TALKING MACHINE.  
APPLICATION FILED DEC. 3, 1914.

Reissued Dec. 21, 1915.

14,035.



Witnesses  
J. B. Wegenast.  
R. C. Fitzhugh.

Clinton E. Woods.

By  
Mauro, Cameron, Lewis & Mason  
Attorneys



# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## TALKING-MACHINE.

14,035.

Specification of Reissued Letters Patent. Reissued Dec. 21, 1915.

Original No. 1,108,301, dated August 25, 1914, Serial No. 734,236. Application for reissue filed December 3, 1914. Serial No. 875,383.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

My invention relates to the sound-conveyer employed in talking-machines for connecting the sound-box with the amplifying horn. This conveyer is frequently referred to in the art as a "tone-arm".

One object of the invention is to produce a tone-arm that is correctly designed, from an acoustical point of view, and with a continuous and unobstructed passage-way for the sound-waves from the vibrating diaphragm to the horn.

Another object is the production of a tone-arm which shall be free from vibration and free from rattling of the parts, yet capable of universal movement.

A further object is the production of a standardized tone-arm,—that is, one which can be used to equal advantage on a "visible horn" machine or a "concealed horn" machine,—at the same time being simple and efficient in construction, and attractive in appearance.

The invention will be best understood by reference to the accompanying drawings, in which—

Figure 1 is a side view of a portion of the so-called "tone-arm" or sound-conveyer, mounted for use with a "concealed horn" talking-machine so-called, showing the mounting therefor in vertical section; Fig. 2 is an end view of the same, looking from the right of Fig. 1, and partly in section; Fig. 3 is a plan view of Fig. 1, partly in horizontal section; Fig. 4 is a side view showing the tone-arm in connection with a "visible horn" machine; and Fig. 5 is a sectional view showing details.

Referring to Figs. 1-3, 1 represents the stationary member, shown as a vertical tube or sleeve having a horizontal flange 2, and adapted to be secured upon the supporting shelf of the cabinet (or upon the base-plate of the talking-machine), to communicate with the smaller end of the usual stationary sound-conveyer or "horn" contained within the cabinet (but not shown). 3 is the tubu-

lar intermediate member or elbow, having the reduced portion 4 fitting snugly within the bore of the stationary member 1, and having the shoulder 5 resting upon the upper end of the same. 6 is a horizontal slot in the reduced portion 4, and 7 a set-screw carried by the stationary member and entering said slot to limit the axial movement of the elbow, and also serving to prevent withdrawal thereof. 8 is the swinging sound-conveyer or "tone-arm", having the proper taper, and carrying at its outer end any suitable sound-box (not shown), and at its inner end curved (in a horizontal plane) to present the elbow 9. This elbow 9 is swiveled to the intermediate elbow 3 so as to swing in a vertical plane, so that by reason of this joint and the swiveling of the intermediate member in the stationary member 1, the sound-box can have universal movement.

More specifically, the tone-arm and the intermediate member are telescoped and are detachably connected by a breech-lock or bayonet-joint coupling, in which 10 represents an interrupted radial flange carried by the reduced cylindrical portion 11 of the elbow 9 to constitute the male member; and 12 (Fig. 3) is the interrupted internal flange carried by the elbow-member 3 to provide an annular groove, thus constituting the female member for receiving the interrupted flange 10. The end-face of the reduced portion 11 is cut away at 13, to receive the tapered stop-pin 14 which projects from the set-screw 15 carried by the intermediate member 3. Diametrically opposite this cut-away 13, is a similar cut-away 16, for the purpose to be described later.

17 is a thin piece of spring material arcuate in form and preferably a complete annulus, secured, as by screws 18, upon the end-face of the reduced portion 11, concentric therewith, and adapted to bear upon the tapered stop-pin 14, to prevent any looseness of parts and consequent rattle. By turning the set-screw 15 in or out, the tensioned engagement between the spring 17 and the stop-pin 14 can be properly adjusted, the tone-arm and the intermediate member being drawn toward each other when the stop-pin is forced inwardly.

It will be observed that the spring 17 is of the cantaliver type. By a cantaliver



spring is meant one which is rigidly connected at one or more points to the member which carries it and which projects from the point or points of connection, the projecting part having lateral engagement with another member. The efficacy of a cantaliver spring is dependent not only on its own resiliency, but also on the rigidity of its connection to its support. In the present instance, the annular spring 17 is rigidly connected to the portion 11 of the elbow 9 by the two screws 18 and from the screws it projects transversely to the side of the elbow where it is laterally engaged by the pin 14.

It will be observed that there is a continuous and uninterrupted passageway from the sound-box—through the tone-arm, the intermediate elbow, and the stationary member—into the stationary horn; and that there are no projections (of fastening-devices or the like) into this passageway, nor are there any such external projections. Furthermore, owing to the fewness of parts and their simplicity of construction and directness of connection, and the consequent absence of rattle, the present construction permits dispensing with the soft-rubber insulation heretofore commonly employed in connecting the sound-box to the tone-arm. Indeed, the sound-box may be made integral with, or secured directly and rigidly to, the end of the tone-arm.

Referring now to Fig. 4, 20 represents the supporting-bracket commonly employed in "visible horn" machines, to which any suitable horn 21 is secured in any convenient usual manner. The same intermediate elbow 3 has, however, been turned upside down, and its reduced portion 4 is journaled within the bracket, so that the elbow itself depends therefrom. The set-screw 15 has been retracted, so as to permit the tone-arm 8 to be swung through an angle of 180° in order to bring the sound-box and its stylus into proper position; and the set-screw 15 has then been restored to place, engaging with the second cut-away 16. In short, by means of the present invention the tone-arms and the intermediate elbows are standardized and can be put in stock, ready for use as desired, either upon the "concealed horn" machines or upon the "visible horn" machines, which greatly simplifies and cheapens manufacturing-operations. And, in either service, the structure is of the greatest efficiency.

I have thus described my invention with considerable detail, but only for the sake of clearness, since my invention is not limited to the details of construction and arrangement above set forth, but may be modified considerably without departing from the spirit of the invention. For instance, the male and female coupling-members might

be mutually transposed, or some other form of coupling employed; the anti-rattling spring 17 might be dispensed with altogether; or some other anti-rattler employed; and other changes made without departing from the broad invention.

Having thus described my invention, I claim:—

1. In a tone-arm for talking machines, a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a bayonet-joint connection between said horizontally extending members, and a cantaliver spring mounted on one of said members and bearing against the other, the tendency of said spring being to force said members toward each other.

2. In a tone-arm for talking machines, the combination of a vertical member having a horizontally extending elbow and a horizontal member having a corresponding horizontally extending elbow, one of said elbow members having interiorly formed bayonet-joint elements and the other elbow member having corresponding bayonet-joint members on the reduced end thereof, and a spring mounted on said reduced end and bearing against the other member.

3. In a tone-arm for talking machines, the combination of a vertical member having a horizontally extending elbow and a horizontal member having a corresponding horizontally extending elbow, one of said elbow members having interiorly formed bayonet-joint elements and the other elbow member having corresponding bayonet-joint members on the reduced end thereof, a spring mounted on said reduced end and bearing against the other member, and means for adjusting the tension of said spring.

4. In a tone-arm for talking machines, a vertical member, a horizontal member, a spring mounted on one of said members, and means mounted on the other member and projecting between said spring and the member on which said spring is mounted, said means being adjustable to force said members toward each other.

5. In a tone-arm for talking machines, a vertical member, a horizontal member, a circular spring mounted on one of said members, and means mounted on the other member and projecting between said spring and the member on which said spring is mounted, said means being adjustable to force said members toward each other.

6. In a tone-arm for talking machines, a vertical member, a horizontal member, a cantaliver spring mounted on one of said members, and a pin mounted on the other and engaging said spring, said pin being adjustable to draw said members toward each other.

7. In a tone-arm for talking machines, a



vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a cantaliver spring mounted on one of said members, and a pin mounted on the other and engaging said spring.

8. In a tone-arm for talking machines, a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a circular spring mounted on one of said members, and a pin mounted on the other and engaging said spring.

9. In a tone-arm for talking machines, a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a spring mounted on one of said members, and a tapering pin mounted on the other and engaging said spring.

10. In a tone-arm for talking machines, a vertical member, a horizontal member, and means for forcing said members toward each other including an element mounted on one member and a device mounted on the other member and projecting between said element and the member on which it is mounted.

11. In a tone-arm for talking machines, a vertical member, a horizontal member, and means for forcing said members toward each other including an element mounted on one member and an adjustable device mounted on the other member and projecting between said element and the member on which it is mounted.

12. In a tone-arm for talking machines, a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a bayonet-joint connection between said horizontally-extending members, and means for forcing said members toward each other including an element mounted on one member and an adjustable device mounted on the other member and projecting between said element and the member on which it is mounted.

13. In a tone-arm for talking machines, a vertical member, a horizontal member, an annulus mounted on one of said members, and means mounted on the other member and projecting between said annulus and the member on which it is mounted, said means being adjustable to force said members toward each other.

14. In a tone-arm for talking machines, a vertical member, a horizontal member, an annulus mounted on one of said members, and a tapering pin mounted on the other member and projecting between said annulus and the member on which it is mounted, said pin being adjustable to force said members toward each other.

15. In a tone-arm for talking machines, a vertical member having a horizontally ex-

tending elbow, a horizontal member having a horizontally extending elbow, a bayonet-joint connection between said horizontally extending members, a spring mounted on one of said members, and means mounted on the other member projecting between said spring and the member on which said spring is mounted, said means being adjustable to force said members toward each other.

16. In a tone-arm for talking machines, a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a bayonet-joint connection between said horizontally extending members, a spring mounted on one of said members, and a tapering pin mounted on the other member projecting between said spring and the member on which said spring is mounted, said pin being adjustable to force said members toward each other.

17. In a tone-arm for talking machines, a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow, a bayonet-joint connection between said horizontally extending members, an annulus secured to one member, and means mounted on the other member projecting between said annulus and the member on which it is mounted, said means being adjustable to force said members toward each other.

18. In a tone-arm for talking machines, the combination of vertical and horizontal hollow sound-conveying members, one of the said members having an elbow detachably telescoped within the other and the two members together providing a single continuous sound-passage, and a spring located inside the tone-arm and outside the sound-passage therethrough, the said spring engaging the end of the said elbow and bearing against the other member, thereby serving to press the elbow endwise relatively to the other member thus preventing rattling.

19. In a tone-arm for talking machines, the combination of vertical and horizontal hollow sound-conveying members, one of the said members being detachably telescoped within the other and the two members together providing a single continuous sound-passage, and a cantaliver spring located inside the tone-arm and connected to one of said members and bearing against the other member.

20. In a tone-arm for talking machines, the combination of a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow horizontally pivoted to the first said elbow, and a cantaliver spring mounted on one of said elbows and bearing against the other elbow.

21. In a tone-arm for talking machines, the combination of a vertical member hav-

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ing a horizontally extending elbow, a horizontal member having a horizontally extending elbow horizontally pivoted to the first said elbow, one of said elbows being provided with a circumferentially extending slot, a spring mounted on the slotted elbow, and a pin mounted on the other elbow in engagement with the spring and extending into the slot and adapted to engage either end thereof to limit relative movement between the elbows.

22. In a tone-arm for talking machines, the combination of a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow horizontally pivoted to the first said elbow, one of said elbows being provided with a circumferentially extending slot, an arcuate spring carried by the slotted elbow and connected thereto at widely separated points, and a pin mounted on the other elbow in engagement with the spring between the said points of connection and extending into the slot and adapted to engage either end thereof to limit relative movement between the elbows.

23. In a tone-arm for talking machines, the combination of a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow horizontally pivoted to the first said elbow, one of said elbows being provided with two diametrically opposite circumferentially extending slots, a spring mounted on the slotted elbow, and a pin mounted on the other elbow in engagement with the spring and adapted to extend into either slot and engage either end thereof to limit relative movement between the elbows.

24. In a tone-arm for talking machines, the combination of a vertical member having a horizontally extending elbow, a horizontal member having a horizontally extending elbow horizontally pivoted to the first said elbow, one of said elbows being provided with two diametrically opposite circumferentially extending slots, an annular spring carried by the slotted elbow and connected thereto at diametrically opposite points between the slots, and a pin mounted on the other elbow in engagement with the spring and adapted to extend into either slot and engage either end thereof to limit relative movement between the elbows.

25. The combination of a sound-box, a normally horizontal element connected at one end with the sound-box and provided at the other end with a horizontal elbow, a

vertical member having at one end an elbow horizontally pivoted to the said horizontal elbow and at the other end one element of a journal bearing, whereby the said member may be turned downward or upward relatively to the horizontal member and be pivotally connected with a horn below or a horn above the horizontal member, and interengaging stop means on the two elbows operable to limit relative movement thereof with the vertical member extending either upward or downward as aforesaid.

26. The combination of a sound-box, a normally horizontal element connected at one end with the sound-box and provided at the other end with a horizontal elbow, a vertical member having at one end an elbow horizontally pivoted to the said horizontal elbow and at the other end one element of a journal bearing, whereby the said member may be turned downward or upward relatively to the horizontal member and be pivotally connected with a horn below or horn above the horizontal member, one of the said elbows being provided with two oppositely disposed circumferentially extending slots, and a pin on the other elbow adapted to engage either of the said slots to limit relative movement between the elbows with the vertical member extending either upward or downward as aforesaid.

27. The combination of a sound-box, a normally horizontal element connected at one end with the sound-box and provided at the other end with a horizontal elbow, a vertical member having at one end an elbow horizontally pivoted to the said horizontal elbow and at the other end one element of a journal bearing, whereby the said member may be turned downward or upward relatively to the horizontal member and be pivotally connected with a horn below or a horn above the horizontal member, one of the said elbows being provided with two oppositely disposed circumferentially extending slots, a pin on the other elbow adapted to engage either of the said slots to limit relative movement between the elbows with the vertical member extending either upward or downward as aforesaid, and an annular spring connected to the slotted member and engaging the pin.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN S. GRIFFITH,  
LAURETTA T. NEAL.

**DESIGN.**

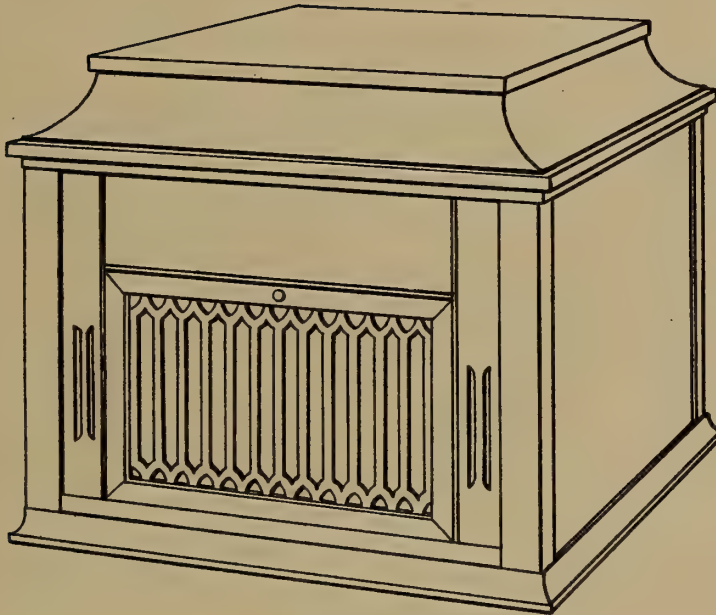
H. B. GREENE.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED MAY 12, 1915.

**48,311.**

Patented Dec. 21, 1915.



INVENTOR  
*Harry B. Greene*  
BY  
*Ed Scherz* ATTORNEY





# UNITED STATES PATENT OFFICE.

HARRY B. GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,311.

Specification for Design.

Patented Dec. 21, 1915.

Application filed May 12, 1915. Serial No. 27,710. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HARRY B. GREENE, a citizen of the United States, residing in Hasbrouck Heights, Bergen county, and State of New Jersey, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a cabinet for phonographs illustrating my new design.

I claim:

The ornamental design for a cabinet for a phonograph substantially as shown.

In testimony whereof I have hereunto signed this specification.

HARRY B. GREENE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES PATENT OFFICE

INVENTION OF \_\_\_\_\_

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**DESIGN.**

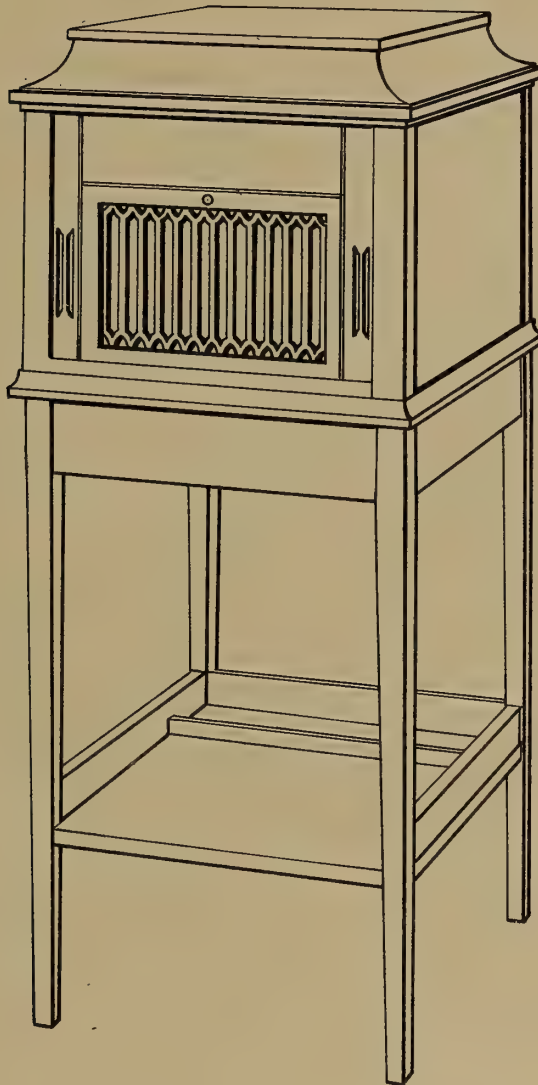
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APPLICATION FILED MAY 12, 1915.

**48,312.**

Patented Dec. 21, 1915.



INVENTOR.  
BY *Harry B. Greene*  
*E. W. Scherff* ATTORNEY.





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HARRY B. GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,312.

Specification for Design.

Patented Dec. 21, 1915.

Application filed May 12, 1915. Serial No. 27,711. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HARRY B. GREENE, a citizen of the United States, residing in Hasbrouck Heights, Bergen county, and State of New Jersey, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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HARRY B. GREENE.

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# THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA

BY

WILLIAM F. STODOLSKY

Author of "The History of the United States of America"

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**DESIGN.**

**H. B. GREENE.**

**CABINET FOR PHONOGRAPHS.**

**APPLICATION FILED MAY 12, 1915.**

**48,313.**

**Patented Dec. 21, 1915.**



INVENTOR

BY *Harry B. Greene*

*Ed. Scherr Jr.* ATTORNEY





# UNITED STATES PATENT OFFICE.

HARRY B. GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,313.

Specification for Design.

Patented Dec. 21, 1915.

Application filed May 12, 1915. Serial No. 27,712. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HARRY B. GREENE, a citizen of the United States, residing in Hasbrouck Heights, Bergen county, and State of New Jersey, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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In testimony whereof I have hereunto signed this specification.

HARRY B. GREENE.

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of the Library, which may be obtained on application to the Librarian

or by mail from the Librarian, New York Public Library, 500 N. 5th St., New York, N. Y.

DESIGN.

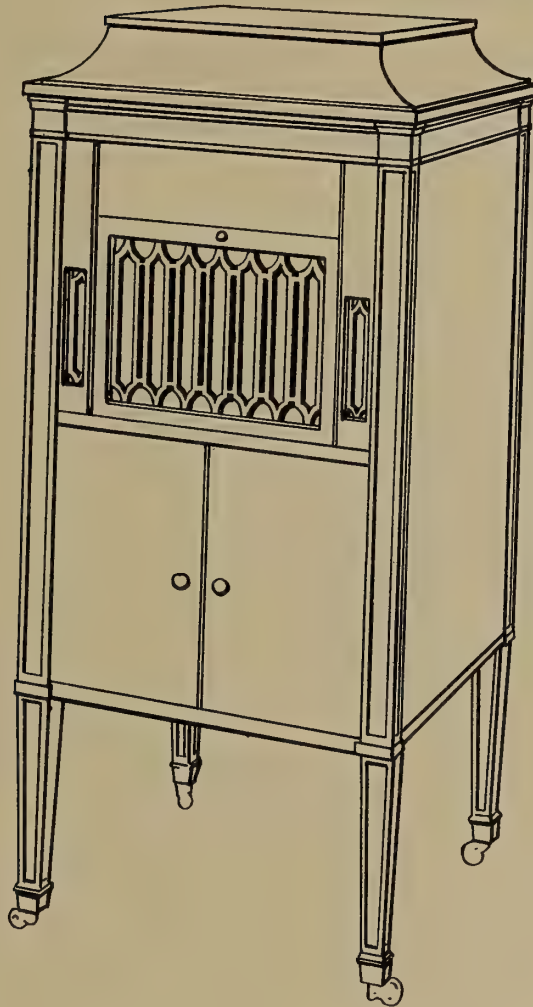
H. B. GREENE.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED MAY 12, 1915.

48,314.

Patented Dec. 21, 1915.



INVENTOR

BY *Harry B. Greene*

*W. Scherr &* ATTORNEY





# UNITED STATES PATENT OFFICE.

HARRY B. GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,314.

Specification for Design.

Patented Dec. 21, 1915.

Application filed May 12, 1915. Serial No. 27,713. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HARRY B. GREENE, a citizen of the United States, residing in Hasbrouck Heights, Bergen county, and State of New Jersey, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a cabinet for phonographs illustrating my new design.

I claim:

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In testimony whereof I have hereunto signed this specification.

HARRY B. GREENE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# THE NATIONAL ACADEMY OF SCIENCES

OF THE UNITED STATES OF AMERICA

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE

FOR THE YEAR 1894

WASHINGTON: GOVERNMENT PRINTING OFFICE: 1895.

THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE  
FOR THE YEAR 1894

WASHINGTON: GOVERNMENT PRINTING OFFICE: 1895.

**DESIGN.**

H. B. GREENE.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED MAY 12, 1915.

48,315.

Patented Dec. 21, 1915.



INVENTOR.

BY *Harry B. Greene*

*E. W. Schenck* ATTORNEY.





# UNITED STATES PATENT OFFICE.

HARRY B. GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,315.

Specification for Design.

Patented Dec. 21, 1915.

Application filed May 12, 1915. Serial No. 27,714. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HARRY B. GREENE, a citizen of the United States, residing in Hasbrouck Heights, Bergen county, and State of New Jersey, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a cabinet for phonographs illustrating my new design.

I claim:

The ornamental design for a cabinet for a phonograph substantially as shown.

In testimony whereof I have hereunto signed this specification.

HARRY B. GREENE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."





**DESIGN.**

H. B. GREENE.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED MAY 12, 1915.

48,316.

Patented Dec. 21, 1915.



INVENTOR.  
BY *Harry B. Greene*  
*E. W. Scherr* ATTORNEY.



# UNITED STATES PATENT OFFICE.

HARRY B. GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,316.

Specification for Design.

Patented Dec. 21, 1915.

Application filed May 12, 1915. Serial No. 27,715. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HARRY B. GREENE, a citizen of the United States, residing in Hasbrouck Heights, Bergen county, and State of New Jersey, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a cabinet for phonographs illustrating my new design

I claim:

The ornamental design for a cabinet for a phonograph substantially as shown.

In testimony whereof I have hereunto signed this specification.

HARRY B. GREENE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





**DESIGN.**

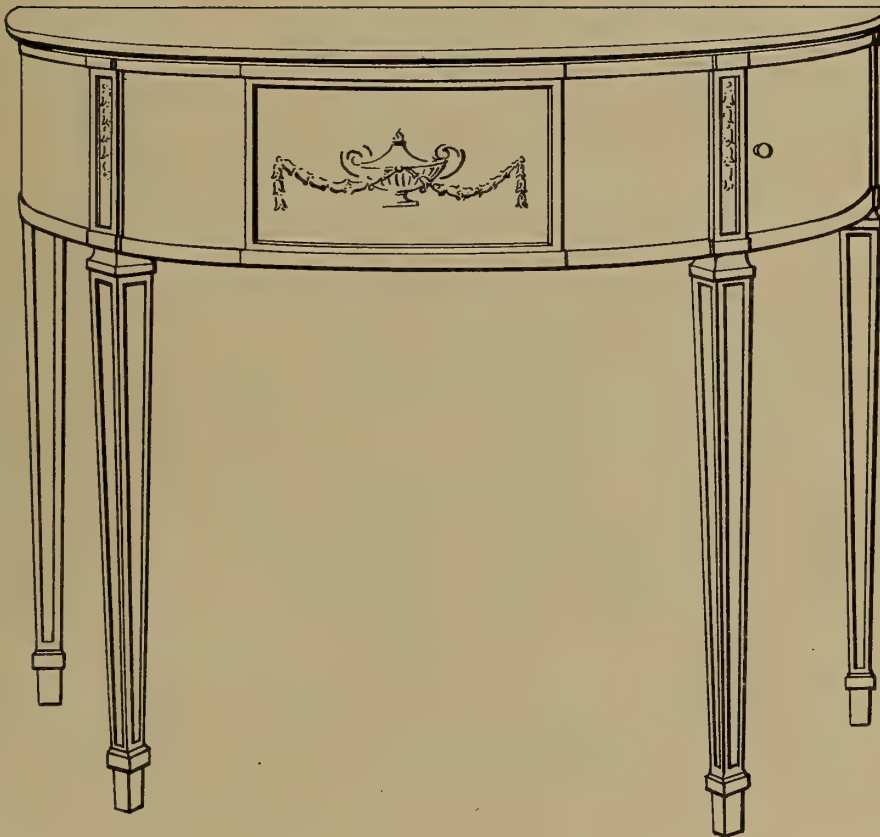
H. B. GREENE.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED MAY 12, 1915.

**48,317.**

Patented Dec. 21, 1915.



INVENTOR  
*Harry B. Greene*  
BY  
*Edw. Scherz* ATTORNEY





# UNITED STATES PATENT OFFICE.

HARRY B. GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,317.

Specification for Design.

Patented Dec. 21, 1915.

Application filed May 12, 1915. Serial No. 27,716. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, HARRY B. GREENE, a citizen of the United States, residing in Hasbrouck Heights, Bergen county, and State of New Jersey, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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I claim:

The ornamental design for a cabinet for a phonograph substantially as shown.

In testimony whereof I have hereunto signed this specification.

HARRY B. GREENE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



DESIGN.

A. W. MENNS.  
PHONOGRAPH CABINET.  
APPLICATION FILED JUNE 9, 1915.

48,325.

Patented Dec. 21, 1915.

FIG. 1.

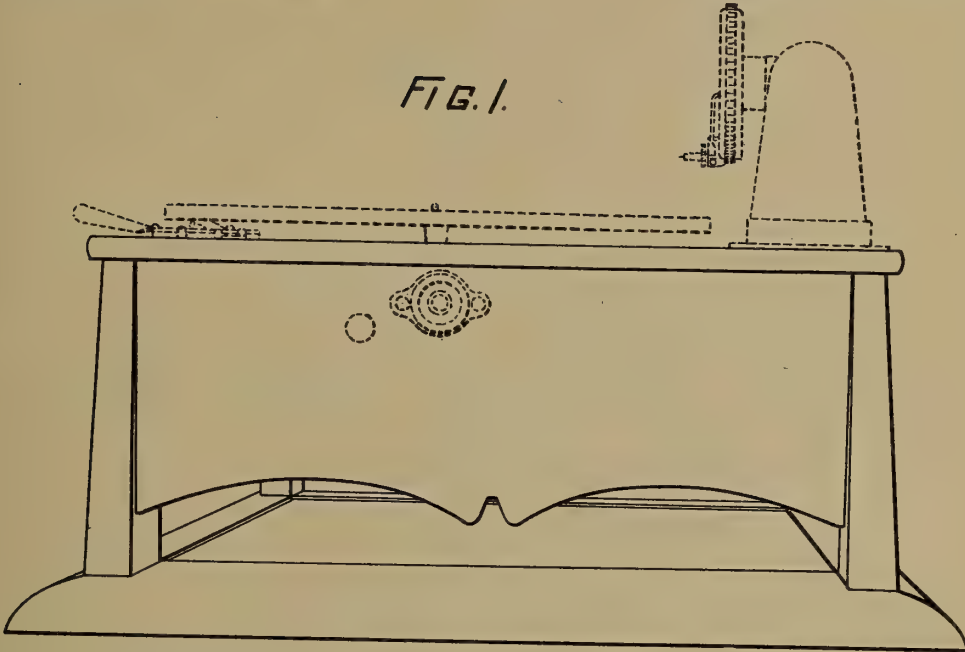
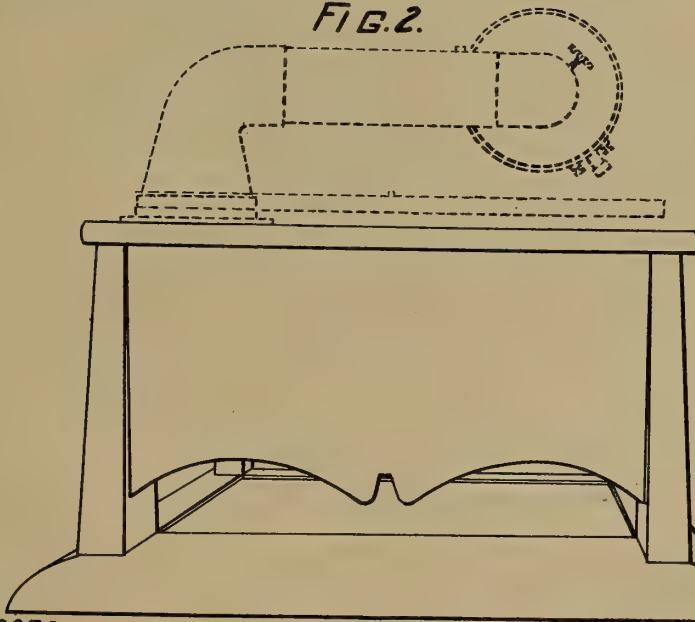


FIG. 2.



WITNESSES

Jas. G. Hamilton.

Louise A. Jordan

Albert W. Menns INVENTOR

BY Clyde L. Rogers  
his ATTORNEY





# UNITED STATES PATENT OFFICE.

ALBERT W. MENNS, OF MALDEN, MASSACHUSETTS, ASSIGNOR TO OPERATONE PHONO-  
GRAPH COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

DESIGN FOR A PHONOGRAPH-CABINET.

48,325.

Specification for Design.

Patented Dec. 21, 1915.

Application filed June 9, 1915. Serial No. 33,185. Term of patent  $3\frac{1}{2}$  years.

*To all whom it may concern:*

Be it known that I, ALBERT W. MENNS, a citizen of the United States, residing at Malden, in the county of Middlesex and Commonwealth of Massachusetts, have invented a new, original, and ornamental Design for a Phonograph-Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

Figure 1 is a front perspective view; and Fig. 2 is a side view of my improved phonograph cabinet design.

I claim:

The ornamental design for a phonograph cabinet as shown.

ALBERT W. MENNS.

Witnesses:

CLYDE L. ROGERS,  
LOUISE A. JORDAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

# UNITED STATES PATENT OFFICE

LEWIS W. BROWN, OF NEW YORK, ASSIGNOR TO THE NEW YORK & NEW JERSEY TRADING COMPANY, INCORPORATED IN NEW YORK.

TRADE-MARK FOR A CIGARETTE

Filed for patent March 10, 1911. Serial No. 811,111.

Specification of Letters Patent granted May 1, 1912.

Be it remembered that I, LEWIS W. BROWN, of the County of New York, State of New York, do hereby certify that the foregoing is a true and correct copy of the original specification of the invention hereinbefore described, and that I am the inventor of the same.

Witness my hand and seal of office this 10th day of March, 1911.

LEWIS W. BROWN,  
Inventor.

JOHN F. BROWN,  
Attorney at Law.

THE UNITED STATES PATENT OFFICE has received the foregoing specification of the invention hereinbefore described, and has caused the same to be printed in the form of a book.



DESIGN.

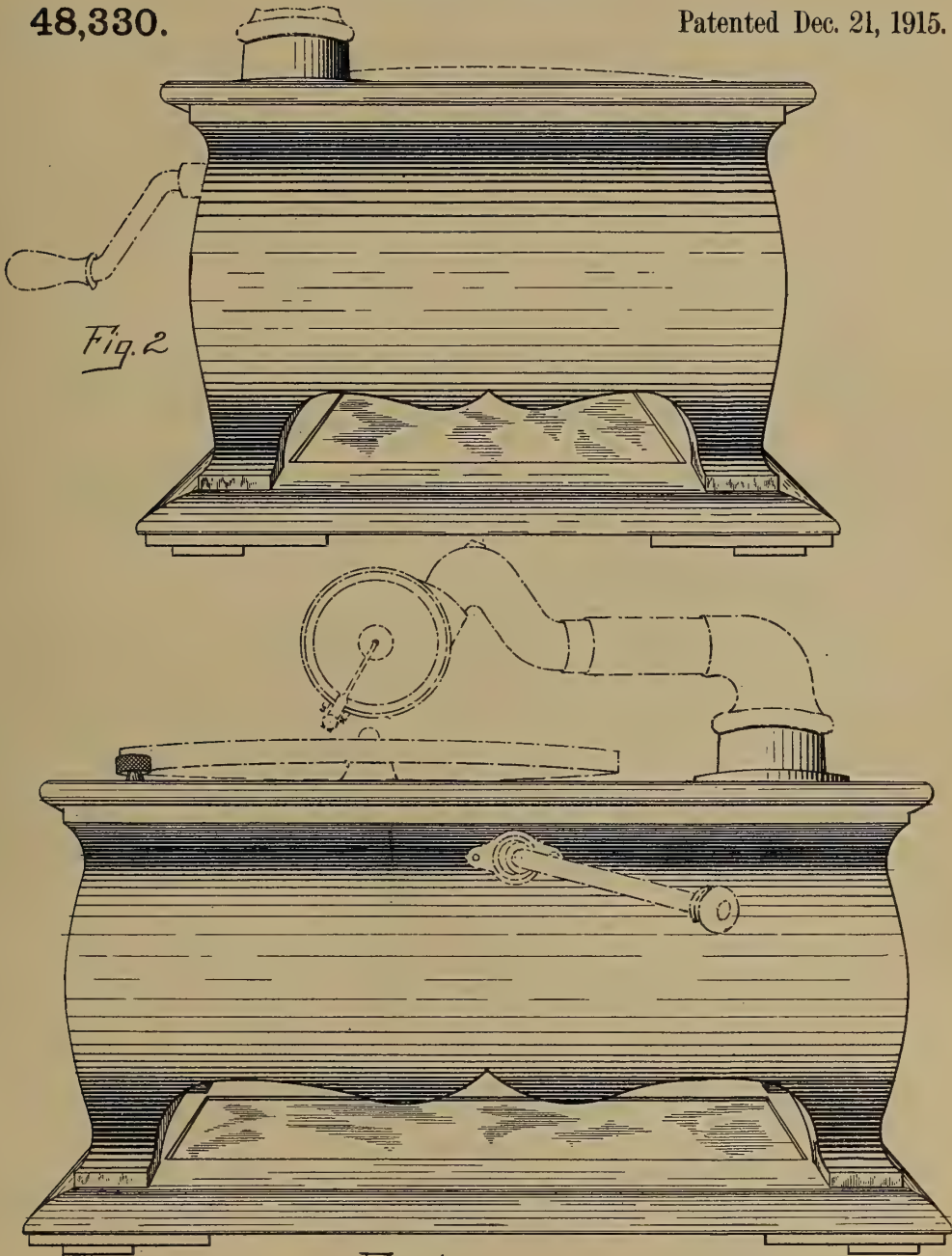
A. SHALES.

PHONOGRAPH CABINET.

APPLICATION FILED AUG. 3, 1915.

48,330.

Patented Dec. 21, 1915.



*Fig. 1*

*Inventor:*  
*Alfred Shales,*  
*by Clyde L. Rogers*  
*his Atty.*



# UNITED STATES PATENT OFFICE.

ALFRED SHALES, OF WABAN, MASSACHUSETTS, ASSIGNOR TO OPERATONE PHONO-  
GRAPH COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

DESIGN FOR A PHONOGRAPH-CABINET.

48,330.

Specification for Design.

Patented Dec. 21, 1915.

Application filed August 3, 1915. Serial No. 43,473. Term of patent 14 years.

*To all whom it may concern:*

Be it known that I, ALFRED SHALES, a citizen of the United States, residing at Waban in the county of Middlesex and Commonwealth of Massachusetts, have invented a new, original, and ornamental Design for a Phonograph-Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

Figure 1 is a side view in perspective of a phonograph cabinet showing my new design; and Fig. 2 is an end view in perspective thereof.

I claim:

The ornamental design for a phonograph cabinet as shown.

ALFRED SHALES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



## UNITED STATES PATENT OFFICE

SOUND BOX,

# 1,165,395-----W. N. Dennison.

Patented-December 28, 1915.

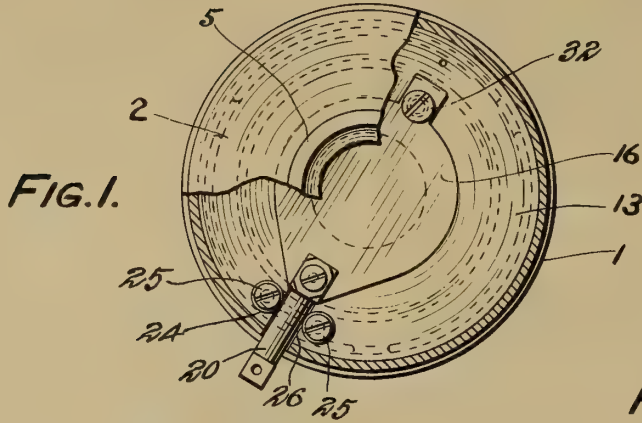
Filed-August 30, 1907.

W. N. DENNISON.  
SOUND BOX.  
APPLICATION FILED AUG. 30, 1907.

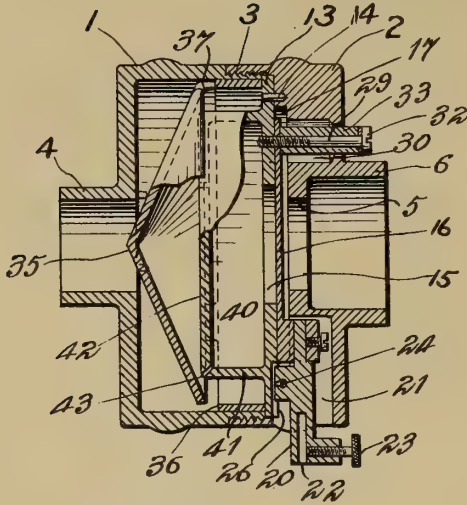
1,165,395.

Patented Dec. 28, 1915.

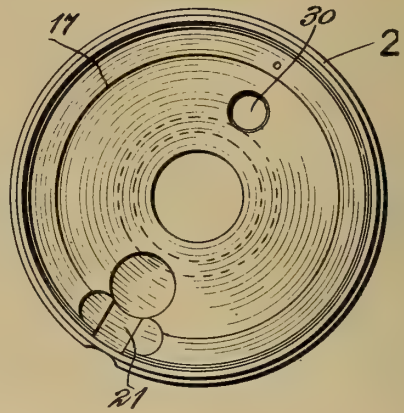
2 SHEETS—SHEET 1.



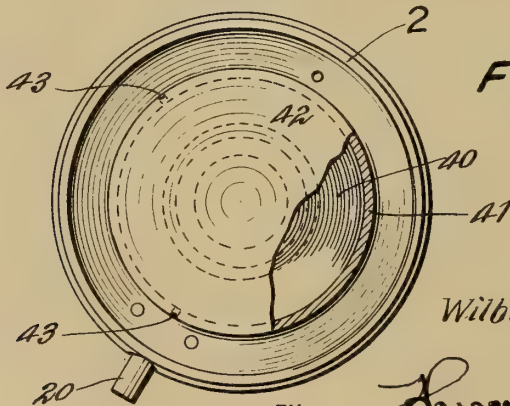
**FIG. 2.**



**FIG. 4.**



**FIG. 3.**



WITNESSES

*H. J. Hartman*  
*A. G. Gardner*

BY

*James Pettit*

INVENTOR

*Wilburn N. Dennison*

ATTORNEY



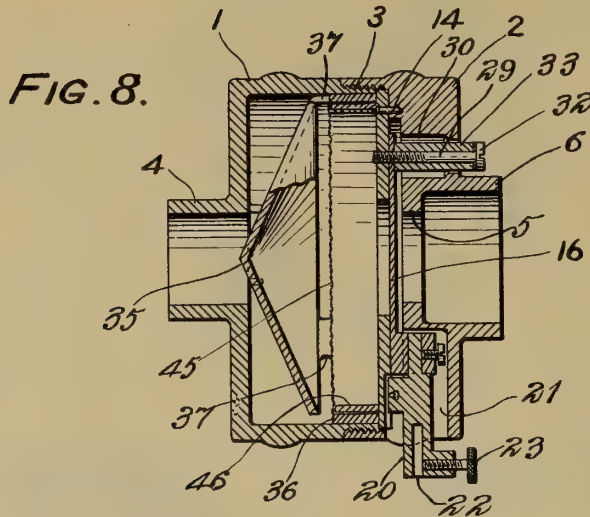


W. N. DENNISON.  
SOUND BOX.  
APPLICATION FILED AUG. 30, 1907.

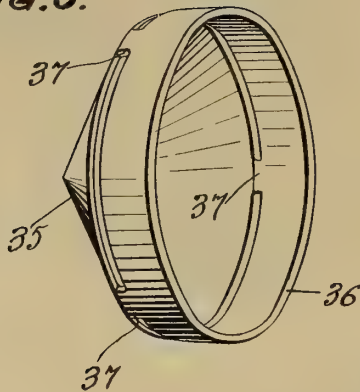
1,165,395.

Patented Dec. 28, 1915.

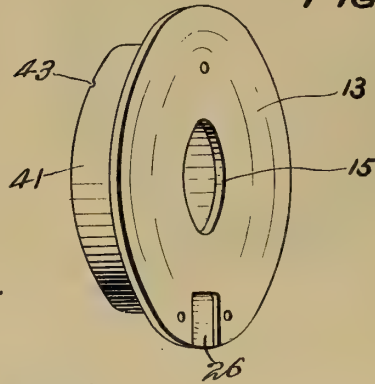
2 SHEETS—SHEET 2.



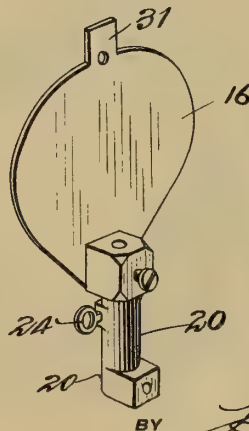
**FIG. 5.**



**FIG. 6.**



**FIG. 7.**



WITNESSES

*H. J. Hartman*  
*A. B. Gardner*

INVENTOR

*Wilburn N. Dennison.*

BY

*Harold Pettit*

ATTORNEY

# UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE BOROUGH, NEW JERSEY, ASSIGNOR TO  
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## SOUND-BOX.

1,165,395.

Specification of Letters Patent. Patented Dec. 28, 1915.

Application filed August 30, 1907. Serial No. 390,741.

### *To all whom it may concern:*

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

The main objects of this invention are to provide an improved pneumatic sound box; to provide in a pneumatic sound box, an improved valve and means for cushioning the same; to provide in a pneumatic sound box improved means for distributing the fluid current; and to provide other improvements as will appear hereinafter.

In the accompanying drawings Figure 1 is a fragmentary front elevation of a sound box constructed in accordance with this invention; Fig. 2 is an inside elevation of a portion of the same; Fig. 3 is a fragmentary interior elevation of a portion of the same; Fig. 4 is a fragmentary longitudinal central section of the sound box; Figs. 5, 6 and 7 are perspective views of details of the same; and Fig. 8 is a fragmentary longitudinal central section of a modified form of sound box constructed in accordance with this invention.

Referring to the drawings one embodiment of this invention comprises a sound box including a hollow substantially cylindrical casing consisting of coaxial sections, a relatively long inner or inlet section 1 and a relatively short outer or outlet section 2, the inner ends of which are screw threaded together as at 3. The inner section 1 is provided with a tubular extension 4 coaxial therewith and forming a tubular inlet for the sound box. The outer section 2 is provided with a central substantially circular aperture 5, forming an outlet for the sound box, and with a corresponding tubular extension 6 coaxial with the outlet 5 and of greater internal diameter than the diameter of the outlet.

For controlling the flow of a current of air or other fluid in the sound box, a circular flat plate 13, forming a valve seat, is arranged within the casing and coaxially therewith, dividing the casing into two compartments. The marginal portion of this plate 13 is securely clamped between the two sections 1 and 2 of the casing in an annular internal groove provided therefor between

these sections, and this plate 13 is positioned by means of a pin 14 extending through the marginal portion of the plate and into the inner surface of the outlet section 2 of the casing. This plate or valve seat 13 is provided with a centrally arranged substantially circular opening 15 forming a valve port which is preferably of a greater diameter, than the diameter of the outlet 5 for a purpose that will appear hereinafter.

For impressing sound waves upon a fluid current passing through the valve port 15, a relatively thin, normally flat flexible valve 16 is arranged between the valve seat 13 and the outer section 2 of the casing, and normally rests flat against the valve seat 13. This valve 16 engages freely in, and nearly fills, a correspondingly shallow circular internal recess 17 provided therefor in the inner wall of the outer section 2 of the casing and coaxial therewith. The central and major portion of this valve is imperforate and is approximately circular in outline and is substantially concentric with the valve port 15 and of a diameter appreciably greater than the diameter of the valve port 15. For vibrating and flexing the valve 16 in accordance with a sound record, the lower portion of the valve is slightly extended and is rigidly secured to the upper end of a stylus bar 20 which projects downwardly freely through an aperture 21 provided therefor through the lower side of the outer section 2 of the sound box casing, and the lower end of which is provided with the usual socket 22 adapted to hold a stylus (not shown) and with the usual set screw 23 for holding the stylus in position. This stylus bar is supported for oscillation upon a flexible connection 24 which extends transversely through the stylus bar approximately in a plane with the outer surface of the valve seat 13. The ends of the connection 24 are secured to the valve seat 13 by screws 25 and the lower portion of the outer face of the valve seat 13 is recessed as at 26 to permit of the free oscillation or vibration of the stylus bar about the flexible connection 24.

For holding the valve 16 normally flat against its seat 13, the upper portion of the valve is yieldingly held against the seat by a screw 29 which is parallel to the longitudinal axis of the sound box and passes loosely through an aperture 30 provided therefor in the outer section 2 of the casing, and loosely



through an extension 31 provided on the valve diametrically opposite the stylus bar. The outer end of the screw 29 is provided with a head 32 and the inner end of the screw is threaded snugly through the valve seat 13. Surrounding the screw 29 is a sleeve 33 made of rubber or other similar resilient material which is adjustably clamped between the head 32 of the screw 29 and the outer surface of the valve 16 and normally presses the valve flat against its seat. It is believed that improved results are obtained by the use of this yielding connection and these results are thought to be due to the fact that under the combined action of the stylus bar and the yielding connection, the valve is flexed diametrically at the beginning of each oscillation of the stylus bar, and begins the opening or closing of the valve port in a diametrical region of the port and continues the opening or closing of the port uniformly in opposite directions from the diametrical region. This yielding connection may however be omitted and good results may still be obtained.

For spreading the fluid current as it enters the casing through the inlet 4, a conical deflector or spreader 35 is arranged within and coaxial with the inner section 1 of the casing and with its apex projecting slightly within the inlet 4 and its sides flaring or diverging outwardly. The edge or marginal portion of this deflector is spaced from the inner cylindrical surface of the inner section 1 of the casing and the deflector is supported by a cylindrical ring 36 which is arranged between the deflector and the valve seat 13, and which fits tightly within the inner section 1 of the casing, and with its outer edge in contact with the inner surface of the valve seat 13. The deflector 35 is held with its edges spaced slightly away from the inner edge of the ring 36 by means of relatively narrow strips 37 arranged at intervals around, and projecting from the edge of the deflector and connecting the edge of the deflector with the inner edge of the ring 36, the deflector 35, strips 37, and ring 36 being either integral one with each of the others, as shown, or constructed of separate pieces secured together in any suitable manner.

For receiving the fluid current after it has been subjected to the action of the spreader 35 and for delivering the current to the valve port 15 under substantially uniform pressure throughout the entire area of the port, a substantially cylindrical cup or closure 40 is arranged within the casing, and coaxially therewith, between the conical deflector 35 and the valve seat 13. This cup comprises a cylindrical wall 41 and a flat circular wall 42, the cylindrical wall being secured to and projecting inwardly from the valve seat 13 and the flat circular wall 42

being parallel to the valve seat 13 and marginally connected in a circular region to the inner margin of the cylindrical wall. The external diameter of the cylindrical wall 41 is preferably somewhat less than the diameter of the deflector 35 and the flat circular wall 42 is preferably arranged approximately in the plane of the edge of the deflector, the walls of the cup being spaced slightly from the deflector. The walls of the cup are imperforate except for a series of spaced, relatively small apertures 43, which are provided through the circular region of connection between the cylindrical wall 41 and the flat wall 42. Preferably but three of these apertures 43 are used and these converge inwardly toward the outlet 5 of the sound box. The arrangement of the apertures 43 is such that it is necessary for the fluid current to pass around the edge of the deflector and to reverse its direction of flow before being admitted into the interior of the cup 40.

As shown in Fig. 8, the hereinbefore described construction may be modified by omitting the hereinbefore described cup 40 and substituting a diaphragm 45 of silk or other similar foraminous material stretched across the interior of the casing, the edge of the diaphragm being turned forwardly in a cylindrical flange and being clamped against the inner surface of the ring, supporting the deflector, by an inner ring 46.

When in operation, this improved sound box is ordinarily supported in a well known manner to cooperate with a sound record, the tubular inlet 4 of the sound box being arranged in communication with any suitable source for supplying the sound box with compressed air and the outlet 5 of the sound box being arranged to communicate with a horn or sound amplifier. The air or other fluid current is spread outwardly in the sound box by the deflector or spreader and is then distributed either through the apertures 43 of the cup 40, or through the foraminous diaphragm 45, as the case may be, to the valve port 15. As the fluid presses through the port 15 it is acted upon by the flexible valve 16, which impresses undulations corresponding to sound waves upon the current, and as the central and major portion of the valve is approximately circular, and appreciably of greater diameter than the valve port the valve deflects all of the current and causes it to flow around the margin of the valve, and, as the outlet 5 is of less diameter than the diameter of the valve, substantially all of the current is deflected by the inner surface of the outer section 2 of the casing and is caused to pass through the narrow space or trap between this surface and the surface of the valve to cushion the valve and is then permitted to pass out through the outlet 5.



Although only two forms have been shown in which this invention may be embodied, it is to be understood that the invention is not limited in its application to any specific construction but might be applied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described my invention what I claim and desire to protect by Letters Patent of the United States is:

1. A sound box comprising a hollow casing having an inlet at one end and an outlet at the opposite end, a plate between said ends dividing the interior of the box into two compartments and provided with a valve port, a valve mounted to vibrate over said port, means to vibrate said valve in accordance with a sound record, and a cup forming a chamber over said valve port and having apertures adjacent the peripheral edge only of said chamber to admit a fluid current.

2. A sound box comprising a hollow casing provided with an inlet at one end and an outlet at the opposite end, a plate between said ends dividing the interior of the box into compartments, a side of said plate being in close proximity to the inner surface of the end of said box and forming an air trap, surrounding said outlet, said plate being provided with a central aperture forming a valve port, an imperforate valve mounted to vibrate over said port and to cover the same and means to vibrate said valve in accordance with sound waves, the edges of said valve extending into the restricted space between said valve plate and the adjacent end of the sound box casing, whereby when a fluid is forced through said valve port all of the fluid will be reflected by the inner surface of the adjacent end of said casing within the trap thus formed to cushion said valve.

3. A sound box comprising a hollow casing having an inlet and a valve port, a valve arranged to cooperate with said port, means to vibrate said valve in accordance with sound waves, a member forming a chamber over the inlet side of said valve, said chamber having provisions for permitting air to enter said chamber, and a deflector arranged in said casing and provided with a marginal portion spaced from the interior walls of said casing and extending over and beyond the adjacent end of said member, whereby the air entering said inlet is first diverted outwardly toward the walls of the casing and then deflected in the reverse direction before entering said chamber.

4. A sound box comprising a hollow casing, a deflector located within said casing, and an annular support inclosed by said casing and secured to the edge of said deflector in spaced relation thereto to position said deflector in said casing.

5. A sound box comprising a hollow casing, a conical deflector located within said casing, and a cylindrical ring inclosed by said casing and secured to the edge of said deflector but spaced therefrom to position the same in said casing.

6. In a pneumatic sound box, the combination with a valve seat provided with a port, of a valve arranged to vibrate toward and away from said seat and having an imperforate major central portion extending over the entire area of said port and arranged upon the outlet side of said port, means arranged to vibrate said valve in accordance with sound waves, and means arranged to reflect all of the fluid current after it has passed through said port, to balance said valve, said valve being arranged between said last mentioned means and said seat.

7. In a pneumatic sound box the combination with a valve seat provided with a substantially circular port, of a valve arranged to vibrate toward and away from said seat and having an imperforate portion extending over the entire area of said port and arranged upon the outlet side of said port, means arranged to vibrate said valve in accordance with sound waves, and means arranged to reflect all of said fluid current after it has passed through said port, to balance said valve, said valve being arranged between said last mentioned means and said seat.

8. In a pneumatic sound box, the combination with a valve seat provided with a port, of a flexible valve arranged to oscillate toward and away from said seat and having an imperforate portion extending over the entire area of said port and arranged upon the outlet side of said port, means arranged to vibrate said valve in accordance with sound waves, and means arranged to reflect all of the fluid current after it has passed through said port, to balance said valve, said valve being arranged between said last mentioned means and said seat.

9. In a pneumatic sound box, the combination with a valve seat provided with a port, of a valve arranged to oscillate toward and away from said seat, said valve having an imperforate flexible portion extending over the entire area of said port, means arranged to vibrate said valve in accordance with sound waves, and means arranged to reflect all of the fluid current after it has passed through said port to balance said valve, said valve being arranged between said last mentioned means and said seat.

10. In a pneumatic sound box, the combination with a valve seat provided with a port arranged centrally with respect to said seat, a valve mounted to vibrate toward and away from said seat and having an imperforate portion extending over the entire

area of said port, means arranged to vibrate said valve in accordance with sound waves, and means arranged to reflect all of the fluid current after it has passed through said port  
5 to balance said valve, said valve being between said last mentioned means and said port.

11. In a sound box the combination with a casing having an inlet, of means coöperating with said casing for impressing sound waves upon a fluid current after it has passed through said inlet, and means arranged within said casing between said first mentioned means and said inlet for spreading  
10 said fluid current in said casing and comprising a deflector provided with a marginal edge spaced from the inner wall of said casing and means secured to and projecting from said edge for holding said deflector in position.  
20

12. A sound box comprising a hollow casing having an inlet and a valved port, a valve arranged to coöperate with said port, means to vibrate said valve in accordance  
25 with sound waves, a member forming a chamber over the inlet side of said valve, said chamber being spaced apart from the inner walls of said casing and having provisions for permitting air to enter said

chamber, and a deflector arranged in said casing and provided with a marginal flange projecting into the space between said member and the inner walls of said casing and covering the adjacent end of said member. 30

13. A sound box comprising a plate, provided with a port, a valve arranged upon one side of said plate to control said port, means to vibrate said valve in accordance with sound waves, and a cup arranged upon the other side of said plate forming  
35 an inclosure over said port, said cup comprising a substantially cylindrical wall surrounding said port and having one edge secured to said plate, and a substantially flat circular wall joined to the other edge of said  
40 cylindrical wall, and said cup being provided with a plurality of apertures extending therethrough in the circular region of connection between said cylindrical wall and said flat circular wall, the walls of said cup  
45 being otherwise imperforate. 50

In witness whereof, I have hereunto set my hand this twenty-eight day of August, A. D. 1907.

WILBURN N. DENNISON.

Witnesses:

A. I. GARDNER,  
ALEXANDER COOK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



TALKING MACHINE,

# 1,165,396-----W. N. Dennison,

Patented-December 28th, 1915,

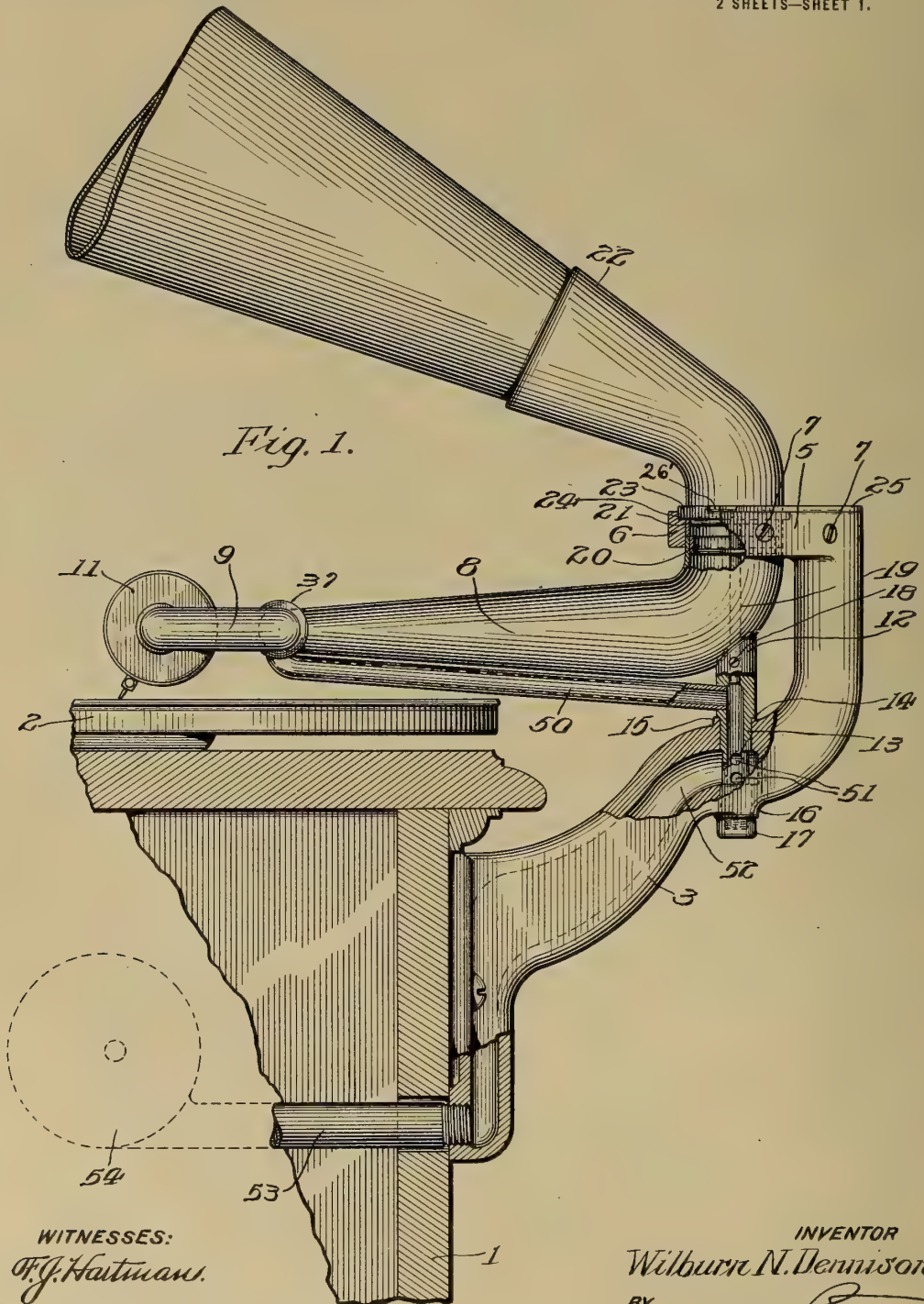
Filed-April 26, 1909.

W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED APR. 26, 1909.

1,165,396.

Patented Dec. 28, 1915.

2 SHEETS—SHEET 1.



WITNESSES:  
*F. J. Hartman.*  
*Alexander P. Moulton*

INVENTOR  
*Wilburn N. Dennison.*  
BY *James P. [Signature]*  
ATTORNEY.

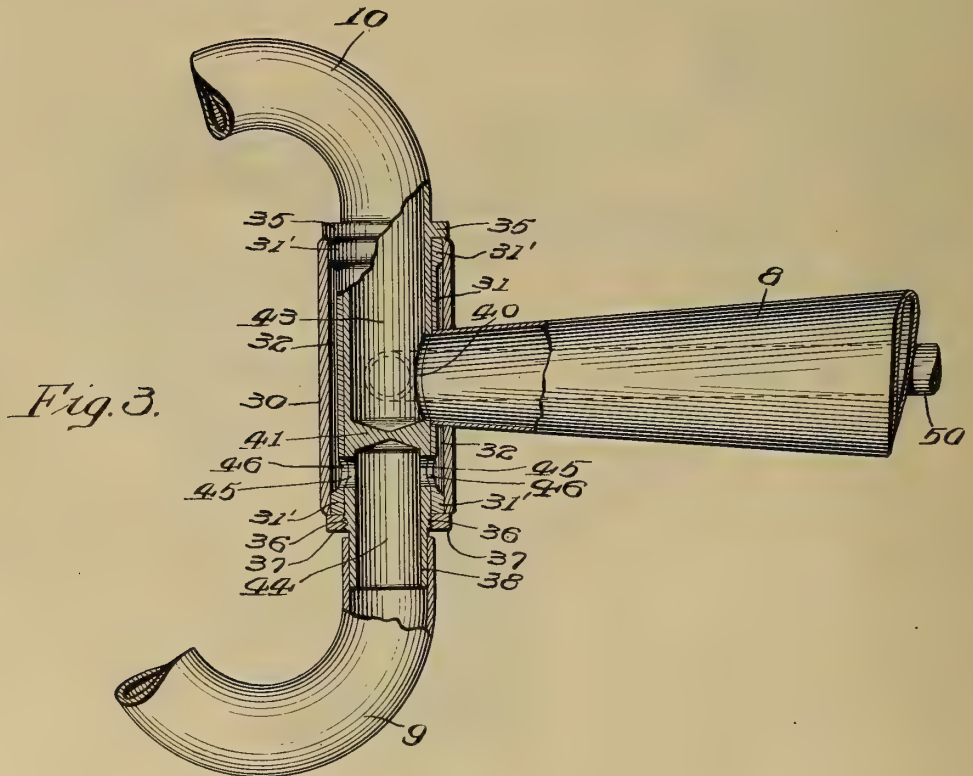
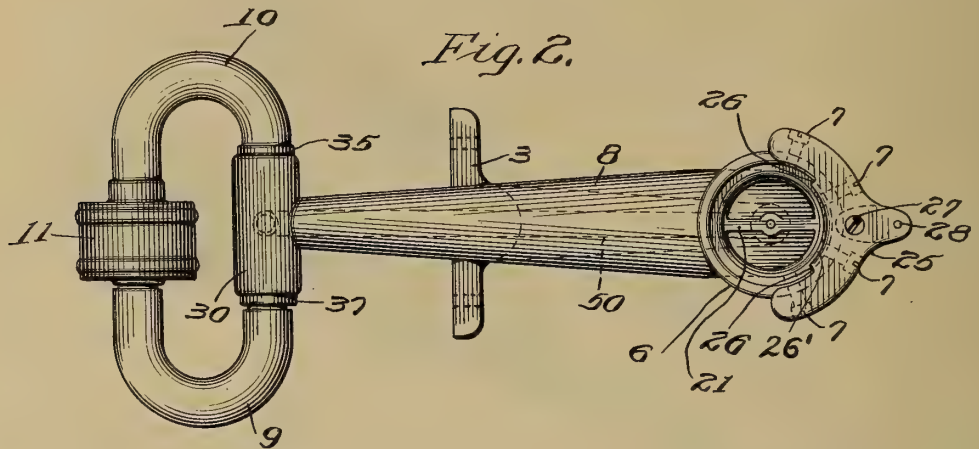




W. N. DENNISON.  
TALKING MACHINE.  
APPLICATION FILED APR. 26, 1909.

1,165,396.

Patented Dec. 28, 1915.  
2 SHEETS—SHEET 2.



WITNESSES:  
*H. G. Hartman.*  
*Alexander B. Moulton.*

INVENTOR  
*Wilburn N. Dennison.*  
BY *I. Mac. Felix.*  
ATTORNEY.

# UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE BOROUGH, NEW JERSEY, ASSIGNOR TO  
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE.

1,165,396.

Specification of Letters Patent.

Patented Dec. 28, 1915.

Application filed April 26, 1909. Serial No. 492,229.

*To all whom it may concern:*

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are, to provide in a pneumatic talking machine, improved means for conveying compressed air to the sound box; to provide a pneumatic talking machine of graceful appearance, and of compact, strong, and durable construction; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmental side elevation partly in vertical section, of a talking machine constructed in accordance with this invention; Fig. 2 a top plan view of a portion of the same; and Fig. 3 an enlarged fragmentary top plan view partially in transverse central section of a portion of the same.

Referring to the drawings, one embodiment of this invention comprises the usual casing 1, rotatably mounted upon which is the usual turntable 2 for carrying a disk record. Rigidly secured to the outer surface of one side of the casing is a fixed support which is shown in the drawings as a rigid hollow bracket 3 which is curved outwardly and upwardly from the casing and the upper portion of which extends vertically and terminates in an inwardly extending substantially horizontal lug 5, the inner surface of which is concave and substantially semi-cylindrical about a vertical axis.

Rigidly secured within the semi-cylindrical lug 5 and coaxial therewith is a ring 6, forming with the spider 21 a removable bearing for the larger or pivoted end of the swinging sound conveying arm, the ring being held in fixed position by means of screws 7 extending radially through the lug 5, and threaded into the ring.

Mounted within the ring 6 to swing over the record in a plane substantially parallel to the plane of the record surface, and depending downwardly from said ring is the larger end of a swinging tone arm carrying at its outer end a pneumatic sound box 11 operatively connected thereto by means of the U-shaped tubes 9 and 10, having their opposite ends connected to said arm and

sound box respectively, said sound box being so secured to swing in a plane substantially transverse to the plane of the turntable or record surface.

In the form of my invention illustrated in the drawings, the swinging tone arm is shown as a tapering sound conducting tube or member 8 having jointed thereto the U-shaped tube 10, and said arm is supported by means of a hollow pivotal member or projection 12 preferably rigid with said arm and depending downwardly therefrom in alignment with the axis of said ring 6. The lower portion 13 of the hollow pivotal member 12 is cylindrical and reduced in size, forming with the upper portion an annular shoulder 14, and the reduced portion forms a cylindrical journal which fits snugly but turns freely in a cylindrical bearing provided therefor through the upper and lower walls of the bracket. The said bearing is surrounded upon the upper side of the bracket by an annular boss 15 integral with the bracket against which the shoulder 14 of the said member 12 engages. The lower end of the said pivotal member extends through the bracket and is surrounded by an annular boss 16 integral with the bracket, against which engages a nut 17 threaded upon the end of the said pivotal member. The upper portion of the said pivotal member 12 is provided with an axial socket in which is rigidly secured, by means of a screw 18 threaded into the said pivotal member, a pin or pintle 19. The pin 19 extends upwardly from the said pivotal member 12 and snugly through an aperture provided therefor in a spider 20 tightly fitted within the upper open end of the tapering sound conducting tube 8, and projects above the end of the tube and engages rotatably in an aperture provided therefor in an upper spider 21 which fits tightly in the ring 6 rigid with the bracket 3. The undersurface of the upper spider 21 engages against the upper end of the said sound conducting tube 8.

An amplifier or horn 22 is provided which has at its inner end an outwardly extending annular flange 23 which engages rotatably in an annular recess or seat 24 provided therefor in the upper side of the fixed ring 6.

The amplifier is held rotatably in position by means of a flat segmental plate 25 which fits over the upper end of the bracket and is provided with a segmental inwardly ex-



tending projection 26 which fits centrally around the rear side of the amplifier in a segmental recess 26' provided therefor in the upper surface of the annular flange 23 of the amplifier, the bottom surface of the projection contacting against the bottom wall of the recess. The segmental projection extends through an arc of about 90 degrees, while the recess in which it engages extends through an arc of about 180 degrees, thus permitting the amplifier to swing through an arc of about 90 degrees, the ends of the projection acting as stops and engaging the end walls of the recess to limit the movement of the amplifier.

The extent of the swinging of the amplifier may be varied, however, to meet the exigencies of any particular case by varying the length of the segmental projection 26 on the plate 25, or the length of the segmental recess 24' or both, and the invention is not limited to the exact proportions indicated in the above description of the construction shown in the drawings. The plate 25 is fixed upon the end of the bracket by means of a screw 27 extending through the plate and threaded into the bracket, and a pin 28 rigid with the plate and projecting into an aperture provided therefor in the bracket.

For connecting the U-shaped tubes 9 and 10 to the tapering sound conducting tube 8, the said tube 8 is provided with a transverse sleeve 30 secured thereto in any suitable manner, the end of the said tube 8 projecting for a short distance within the said sleeve 30. Fitted within the sleeve 30 is a bushing 31, the ends 31' of which fit snugly within the said sleeve flush with the ends of the sleeve, and the said bushing 31 is reduced in diameter intermediate of its ends to form an annular passage 32 between the bushing and the sleeve. The end of the sound conducting tube 8 is open and fits closely in an aperture provided therefor in the bushing 31, and holds the bushing in a fixed position, the end edge of the arm 8 terminating flush with the inner cylindrical surface of the said bushing 31.

One of the U-shaped tubes 10, which may be referred to as the delivery U-tube, projects entirely through and is fitted to turn in the bushing 31, and is provided upon one side of the bushing 31 with an annular flange 35 contacting against the adjacent ends of the bushing and sleeve. The end of the delivery U-tube projecting through the bushing 31 is provided with external screw threads 36 adjacent and upon the outside of the bushing and a nut 37 engaging the threads 36 and contacting against the adjacent ends of the said sleeve and bushing to draw the flange 35 of the U-shaped tube into close engagement with the opposite ends of the sleeve and bushing, to hold the U-shaped tube rotatably in position and to seal the

ends of the annular passage 32 between the sleeve and the bushing.

The extreme end 38 of the U-shaped delivery tube 10 is reduced in diameter from the threads 36 outwardly to permit of the free passage of the nut 37 over the reduced end and to receive the adjacent end of the other U-shaped tube 9, which may be referred to as the supply U-tube and which telescopes snugly over the reduced end 38 of the U-shaped delivery tube 10. The interior of the U-shaped delivery tube 10 communicates with the tapering sound conducting tube 8 through an outlet aperture 40 provided therefor in the side of the said tube 10, the outlet registering with the open end of the sound conducting tube 8 when the sound box is in operative position.

A partition 41 is provided within the U-shaped delivery tube 10 between the outlet 40 and the reduced end 38 of the said tube 10, dividing the interior of the said U-shaped tube into two chambers, 43 and 44, the latter chamber 44 communicating with the other U-shaped tube 9. When the sound box is in operative position, the latter chamber 44 also communicates with the annular chamber 32 surrounding the bushing 31, through diametrically opposite inlet apertures 45 in the walls of the U-shaped tube 10 registering with corresponding apertures 46 in the surrounding bushing 31.

For supplying compressed air or other fluid to the sound box through the U-shaped supply tube 9, a supply pipe 50 is rigidly connected at its outer end to the under side of the sleeve 30 through which it communicates with the annular passage 32 surrounding the bushing 31 within the sleeve. The pipe extends parallel and close to the under side of the taper tone arm 8, rigid therewith, and the inner end of the pipe 50 is fitted radially into the hollow pivotal member 12 supporting the radial tone arm and communicates axially downwardly through the said pivotal member, which is made hollow for the purpose, and through the diametrically opposite transverse apertures 51 through the said pivotal member with the interior 52 of the bracket 3. The portion of the bracket between the upper and lower walls thereof, is slightly reduced in diameter to facilitate the construction of the same, and is surrounded by a free space to facilitate communication between the said pivotal member and the interior of the bracket.

The interior of the hollow bracket 3 is supplied with compressed air by means of a pipe 53 extending from the interior of the casing 1 through the side of the casing and threaded into the bracket to communicate with the interior thereof. A mechanism for compressing the air is preferably located in



the casing 1. As diagrammatically illustrated in dotted lines in Fig. 1 the fluid compressing means, or fluid supplying means, may be a rotary compressor 54 connected to the pipe 53, but any suitable means for causing a fluid to pass through the sound box, may be employed as a source of air supply. This arrangement provides a construction in which the conductor, communicating with the sound box, is jointed or articulated or articulative, both at the point of connection between the U-shaped supply tube 9 and the tube 50, and between the tube 50 and the hollow bracket or support 3, and since the articulated air supply tube is pivoted or jointed at one end on an axis coincident with the axis of the pivotal support on which the tone arm 8 swings, and since the U-shaped supply tube 9 swings on an axis coincident with or in alinement with the axis of the sleeve 30, the means for conveying or conducting the fluid for operating the sound box, offers substantially no resistance to the free movement of the tone arm 8, as it swings over the tablet, or to the vertical movement of the U-shaped tubes and the sound box, when the device is employed in a machine for reproducing or recording sound.

In the operation of this device, the compressed air is forced through the pipe 53, bracket 4, hollow pivotal member 12, pipe 50 and into the annular chamber 32 between the sleeve 30 and the bushing 31 from whence, when the sound box is in operative position, it passes through the oppositely disposed apertures 46 and 47 into the chamber 44 in the end of the U-shaped delivery tube 10 and thence through the U-shaped supply tube 9 into the sound box. After passing through the sound box and being set into vibration thereby, the air passes through the U-shaped delivery tube 10, tapering sound conducting tube 8 and into the amplifier. By arranging or disposing the apertures 46 and 47 between the chamber 44 in the end of the U-shaped delivery 10, and the annular chamber 32 between the sleeve 30 and the bushing 31, the effect of the air passing through these oppositely disposed openings is to balance the pressure on the sides of the tube 10 within the bushing; that is to say, the air passing through one opening does not tend to press the tube 10 against the opposite side of the bushing 31 in which it is inclosed, and, therefore, all friction which would otherwise result from the pressure of the air passing through said apertures is entirely eliminated, and the sound box is substantially as free to swing transversely to the record about the sleeved end of the tube 10 as it would be if there was no difference of pressure between the air in the said tube and the outside atmosphere. Moreover, the air, by passing through oppo-

sitely disposed apertures in the chamber 44, flows smoothly through the tube 9 to the sound box. A similar construction is employed in connection with the air passages in the hollow pivotal member 12, in which the apertures 51 put the interior of said member into communication with the interior of said bracket 3. This feature of the balancing of the air, or currents of air in the fluid conducting tubes is one of the features of my invention. The sound box may be rotated upwardly about the axis of its supporting sleeve 30 and brought to rest in an inverted inoperative position upon the upper surface of the taper arm 8, and when in this position it is evident that the apertures 45 and 40, controlling the inlet and outlet of compressed air through the U-shaped tube 10 will be closed, thus stopping the flow of fluid current through the sound box.

In the arrangement of the parts above described, it is plain that the sound box is spaced or separated from, but operatively connected to, both the support for the sound conducting arm 8 and the source of air supply, by the sound conducting arm 8. It is also clear that the fluid is conducted to the sound box through a conductor consisting of a plurality of members jointed or articulated together, said members being in a balanced relation to each other with respect to the tendency of the fluid to press said members against each other transversely at the joints or articulations. The members of each adjacent pair of said jointed members are as above described in balanced communication with each other, and there is substantially no tendency of the parts of the conductor to resist or act in opposition to the free swinging movement of the sound conducting arm as it swings over the face of the record, or to the free oscillation of the section of the conductor between the air supply tube 50 and the sound box. To remove the sound conducting tube 8 from the bracket 3 it is only necessary to remove the screws 7 and free the ring 6 from the upper end of the bracket, and to remove the nut 17, whereupon the tube 8 and its pivotal support 12 may be bodily lifted out of the bracket, the pivotal member sliding freely through the opening in the bracket. This arrangement provides a construction in which the swinging sound conducting tube 8 may be described as mounted in the bracket in two bearings, one of which (the ring 6 having the spider 21) is removable from the bracket, and the other (the walls of the openings in the bracket through which the pivotal member 12 extends) is permanently in the bracket.

While in the specification and claims the expression "pneumatic sound box" is used, the invention is not limited to a sound box in which either compressed or rarefied air is



the medium employed, and the expression "pneumatic sound box" is intended to refer to any sound box through which any suitable fluid is passed, and upon which fluid the undulations are impressed by the vibration of a suitable mechanism primarily operated by undulations corresponding to sound waves.

Although only one form in which this invention may be embodied has been described, it is obvious that many changes might be made in the construction set forth without departing from the spirit of this invention, or the scope of the appended claims.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent of the United States, is:

1. The combination with a hollow pivotal member, of a swinging arm carried by said member, a pneumatic sound box carried by said member with respect to said arm, and a tube fixed upon said arm and communicating with said member and said sound box for supplying air to said sound box.

2. The combination with a hollow pivotal member, of a swinging arm carried thereby, a pneumatic sound box carried by said arm and movable independently of said arm, and means communicating with said member and said sound box to conduct a fluid therebetween.

3. The combination with a hollow pivotal member, of a sound conveying tube carried thereby, and a pneumatic sound box carried by said tube and movable independently thereof, said sound box having an outlet communicating with said tube and an inlet communicating with said member.

4. The combination with a hollow pivotal member, of a hollow tone arm rigid therewith, a sound box pivotally connected to said tone arm, means of communication between said hollow pivotal member and said sound box, and means of communication between said tone arm and said sound box.

5. The combination with a hollow pivotal member, of a swinging sound conducting tube rigid therewith, and a pneumatic sound box pivoted to said tube and having an outlet communicating therewith, and an inlet communicating with said member.

6. In a pneumatic talking machine, the combination with a fixed support, of an arm mounted to swing with respect thereto, a sound box carried by said arm and movable with respect thereto, and a tube having one end in alinement with the axis about which said arm swings, for supplying said sound box with a fluid current.

7. In a pneumatic talking machine, the combination with a fixed hollow support, of an arm mounted thereon to swing in a fixed plane upon a fixed axis, a sound box carried by and movable with respect to said arm, and means communicating with said sup-

port and mounted to swing with said arm for supplying a fluid current to said sound box.

8. In a pneumatic talking machine, the combination with a hollow support, of a sound conducting member mounted thereon to swing upon a fixed axis, a sound box carried by said member and movable with respect thereto and having an outlet communicating therewith, and a tube fixed with respect to said member and communicating with said support for supplying a fluid current to said sound box.

9. In a pneumatic talking machine, the combination with a hollow support, of a sound conducting tube mounted thereon to swing upon a fixed axis, a sound box carried by said tube and movable with respect thereto and having an outlet communicating therewith, and a tube jointed to said support for supplying a fluid current to said sound box.

10. In a pneumatic talking machine, the combination with a pneumatic sound box, of a tubular conveyer communicating therewith and having oppositely disposed apertures, and means surrounding the portion of said conveyer containing said apertures for conducting a fluid current to said apertures.

11. In a talking machine, the combination with a sound box, of a tubular air conveyer communicating therewith having oppositely disposed lateral apertures.

12. In a pneumatic talking machine, the combination with a casing, of a rotary record support carried thereby, a hollow bracket fixed upon said casing, means to convey compressed fluid to said bracket, an arm mounted to swing in a fixed path upon said bracket, a sound box carried by, and movable with respect to said arm toward and away from said record support, and means communicating with said sound box and said bracket to convey a fluid current to said sound box.

13. The combination with a hollow pivotal member, of a swinging arm mounted on said member, a pair of oppositely disposed tubes carried by said arm and movable with respect thereto, and a pneumatic sound box connected to said tubes and having an outlet communicating through one of said tubes with said arm, and an inlet communicating through the other of said tubes with said pivotal member.

14. The combination with a swinging arm, of a sleeve carried thereby, a bushing in said sleeve forming with said sleeve a channel, a pair of oppositely disposed tubes, one of said tubes being rotatably mounted in said bushing and being in communication with said arm, and the other of said tubes being in communication with said channel when said tubes are in operative position, a pneumatic sound box communicating with said



tubes, and means for conveying compressed air to said channel.

15. The combination with a swinging arm, of a sleeve carried thereby, a bushing in said sleeve, said bushing being reduced externally in diameter intermediate of its ends to form with said sleeve a channel, a pair of oppositely disposed tubes, one of said tubes being in communication with said channel when said tubes are in operative position, and a sound box communicating with said tubes.

16. The combination with a bracket of a ring removably secured thereto, hollow sound conducting arm, having one end co-operating with said ring, a pivotal projection rigid with said arm and extending rotatably through said bracket, a spider mounted in said ring, and a pivot extending from said pivotal projection and engaging said spider.

17. The combination with a bracket, of a ring removably secured to said bracket, a sound conducting arm, a pivotal member coaxial with said ring and mounted on said arm and rotatably engaging in a bearing provided therefor in said bracket, said arm having an open end coaxial with said ring, a spider mounted in said ring outside of said arm, a spider mounted in the open end of said arm, and a pivot coaxial with and detachably secured to said pivotal member and engaging said spiders and said pivotal member.

18. In a talking machine, the combination with a casing, a hollow support rigidly secured to said casing, a hollow pivotal member carried by and opening into said support, a pneumatic sound box communicating with and movable about and with respect to said pivotal member, means for conducting a fluid between said sound box and said pivotal member, and means to supply the interior of said support with a fluid current.

19. In a talking machine, a sound box, a source of fluid pressure and conductor including a pair of members, one of which is movable with respect to and is in balanced communication with the other.

20. In a talking machine, a sound box, a source of fluid supply, and a fluid conductor having a plurality of members articulated with respect to each other and provided with means for causing the fluid passing therethrough to balance the tendency of the fluid to press said members against each other at their point of articulation.

21. In a talking machine, a sound box, a source of fluid pressure and a conductor for supplying said sound box with fluid from said source, said conductor comprising a plurality of sections articulated at substantially right angles to each other and provided with means for causing the fluid pass-

ing therethrough to balance the tendency of the fluid to press said members against each other at their points of articulation.

22. In a talking machine, the combination with a sound conveyer tube, a bracket providing a bearing seat, a pivotal support rigidly connected with said tube and rotatably mounted in said bracket and having a shoulder pivotally supported on said seat, and means engaging with said pivotal support for providing against displacement of said shoulder from said seat.

23. In a talking machine, the combination with a movable support, of a sound box carried by and movable with respect to said movable support, a hollow support for said movable support, and means communicating with said hollow support and said sound box for conducting a fluid current from the former to the latter.

24. In a talking machine, the combination with a hollow pivotal member, of a swinging arm carried thereby, a pneumatic sound box carried by and movable independently of said arm, and articulative means comprising relatively movable rigid parts communicating with said sound box and said member and conducting a fluid current from the latter to the former.

25. In a talking machine, the combination with a hollow pivotal member, of a hollow sound conducting tone arm carried thereby, a pneumatic sound box carried by and movable with respect to said tone arm and having an outlet communicating therewith, and an inlet communicating with said pivotal member.

26. In a talking machine, the combination with a hollow pivotal member mounted to turn upon a fixed axis, of a swinging sound conducting tube carried by said member, a pneumatic sound box carried by and movable with respect to said tube, and a tube communicating with said pivotal member for supplying air to said sound box.

27. In a talking machine, the combination with a hollow tone arm, of a hollow bracket, provided with a bearing, and a pivotal support rigidly connected to said arm and rotatably mounted in said bearing and communicating with the interior of said bracket.

28. In a talking machine, the combination with a tone arm, of a hollow bracket, provided with a bearing, a hollow pivotal support connected to said arm and rotatably mounted in said bearing and communicating with the interior of said bracket, and a sound box carried by said tone arm and communicating with said hollow support.

29. In a talking machine, the combination with a hollow tone arm, of a hollow bracket, a hollow pivotal support rigidly connected to said arm and mounted to rotate in an opening provided therefor in said bracket and communicating with the interior of said



bracket, and a sound box carried by said arm and communicating with said pivotal support.

30. In a talking machine, the combination with a swinging arm, of a hollow bracket, a hollow pivotal support rigidly connected to said arm and mounted to turn in said bracket and communicating with the interior thereof, and a removable bearing carried by said bracket coöperating with said arm.

31. The combination with a bracket, of a ring carried thereby, a tone arm having one end coöperating with said ring, a pivotal projection rigid with said tone arm and rotatably engaging in a bearing provided therefor in said bracket, a pivot carried by said projection and telescoping with said pivotal projection longitudinally thereof, and a bearing for said pivot, carried by said ring.

32. The combination with a bracket, of a ring removably secured thereto, a hollow sound conducting tube having one end coöperating with said ring, a pivotal projection rigid with said arm and extending rotatably through and supported in an aperture provided therefor in said bracket in longitudinal alinement with the center of said ring, a pivot telescoping longitudinally and coaxially with said pivotal projection, and a bearing carried by said ring, for said pivot.

33. The combination with a hollow tone arm, of means upon which said tone arm is mounted to rotate, said means comprising a pivotal projection, a bearing for said projection, a pivot telescoping with said projection, and a bearing for said pivot.

34. A talking machine, comprising a sound conveying tube, and means upon which said tube is mounted to oscillate, said means comprising a fixed support, a pivotal projection rigid with said tube and extending rotatably through said support, and means for holding said pivotal projection rotatably in position and against longitudinal movement.

35. In a talking machine, the combination with a sound conveying tube, of means upon which said tube is mounted to oscillate, said means comprising a stationary support, a pivotal projection rigid with said tube and rotatably carried by said support, a pivot telescoping with and carried by said pivotal projection, and a bearing for said pivot carried by said support.

36. In a talking machine, the combination with a sound conveying tube, of means upon which said tube is mounted to oscillate, said means comprising a stationary support, a pivotal projection rigid with said tube and rotatably carried by said support, a pivot telescoping with and carried by said pivotal projection, means for holding said pivot fixed with respect to said pivotal projection,

and a removable bearing for said pivot carried by said support.

37. A talking machine, comprising a sound conveying tube, and means upon which said tube is mounted to oscillate, said means comprising a relatively stationary support, a pivotal projection rigid with said tube and rotatably carried by said support, a pivot co-axial with and carried by said pivotal projection and rigid with respect thereto, and a bearing for said pivot removably carried by said support, said pivotal projection being held fixedly against longitudinal movement.

38. In a pneumatic talking machine, the combination with a hollow bracket forming a duct and providing a bearing, a pivotal member having a bore in communication with said duct, a frame carried by said bracket and forming a bearing, a pintle adjustable in said bore and engaging the bearing in said frame, a tone arm carried by said pivotal member and pintle, a sound box carried by said arm and a conduit connecting said sound box with said bore.

39. In a talking machine comprising a tone arm and sound box, the combination with a hollow bracket having a duct extending therethrough and provided with a bearing, a tone arm supporting pivotal member having a shoulder supported on said bearing and provided with a bore in communication with said duct, a frame carried by said bracket and forming a bearing, a pintle adjustable in said bore and arranged to engage the bearing in said frame, and a conduit connecting said sound box with said bore.

40. In a talking machine comprising a tone arm, and sound box, the combination with a hollow bracket having a duct extending therethrough and providing a bearing, of a tone arm supporting pivotal member extending through said bracket and having a bore in communication with said duct and providing a shoulder rotatable on said bearing, a pintle adjustable in said bore and extending through said tone arm, a conduit connecting said sound box with said bore and at all times in communication with said duct, and means opposite said bearing and secured to said pivotal member to maintain said shoulder in rotatable engagement with said bearing.

41. In a talking machine, the combination with a hollow pivotal member mounted to swing about a fixed axis coincident with its longitudinal axis, of a hollow sound conducting tube mounted to swing about an axis coincident with said first mentioned axis, a pneumatic sound box carried by and movable with respect to said tube and having an outlet communicating therewith, and an inlet communicating with said pivotal member.

42. In a talking machine, the combination

with an arm arranged to swing about a fixed axis, of a sound box carried by and movable with respect to said arm, and a hollow member in axial alinement with the axis about which said arm swings and communicating with said sound box for supplying a fluid current to said sound box.

43. In a talking machine, the combination with a hollow pivotal member mounted to turn about an axis coincident with its longitudinal axis, of a sound conducting tube fixed thereon and carried thereby, and a pneumatic sound box carried by and movable with respect to said tube and having an outlet communicating therewith and an inlet communicating with said pivotal member.

44. In a talking machine, the combination with a rotary record support, of a hollow pivotal member mounted to turn about a fixed axis coincident with its longitudinal axis, a sound conducting tube carried by said member and arranged to swing across said record support, and a pneumatic sound box connected to said tube and having an outlet communicating therewith and an inlet communicating with said pivotal member, said sound box being movable with respect to said tube into and out of operative engagement with a sound record on said support.

45. In a talking machine, the combination with a stationary support, of a sound conveying tube, a pivotal projection rigid with said tube and projecting outwardly therefrom and rotatably engaging in a bearing provided therefor in said support, a pivot coaxial with said pivotal projection and having one end engaging in a longitudinal opening provided therefor in said pivotal projection and having its other end projecting freely from said pivotal projection, and a bearing carried by said support and engaging the latter end of said pivot.

46. In a talking machine, the combination with a stationary hollow bracket, of a sound conveying tube, a hollow pivotal projection rigid with said tube, and rotatably engaging in a bearing provided therefor in said bracket, sound reproducing means carried by said tube and having an outlet communicating therewith and having an inlet communicating with said hollow bracket through said pivotal projection, and means for supplying said hollow bracket with a fluid current.

47. In a talking machine, the combination with a hollow stationary bracket, of a sound conveying tube, a hollow pivotal projection

rigid with said tube and rotatably engaging in a bearing provided therefor in said bracket, a fluid supply pipe extending longitudinally of said sound conveying tube and communicating at one end with said hollow pivotal projection, and a pneumatic sound box having an inlet communicating with said hollow bracket through said supply pipe and said pivotal projection and an outlet communicating with said sound conveying tube.

48. In a talking machine, the combination with a hollow stationary bracket, of a sound conveying tube, a hollow pivotal projection rigid with said tube and rotatably engaging in a bearing provided therefor in said bracket, a fluid supply pipe extending longitudinally of said sound conveying tube and communicating at one end with said hollow pivotal projection, and a pneumatic sound box having an inlet communicating with said hollow bracket through said supply pipe and said pivotal projection and an outlet communicating with said sound conveying tube, said sound box being arranged to move in unison with said sound conveying tube about the longitudinal axis of said pivotal projection, and said sound box also being movable with respect to said sound conveying tube.

49. In a talking machine, the combination with a hollow stationary bracket, of a sound conveying tube, a hollow pivotal projection rigid with said tube and rotatably engaging in a bearing provided therefor in said bracket, a fluid supply pipe extending longitudinally of said sound conveying tube and communicating at one end with said hollow pivotal projection, and a pneumatic sound box having an inlet communicating with said hollow bracket through said supply pipe and said pivotal projection and an outlet communicating with said sound conveying tube, said sound box being arranged to move in unison with said sound conveying tube about the longitudinal axis of said pivotal projection, and said sound box also being movable with respect to said sound conveying tube, about a different axis fixed with respect to said tube.

In witness whereof I have hereunto set my hand this 22nd day of April, A. D. 1909.

WILBURN N. DENNISON.

Witnesses:

FRANK B. MIDDLETON, Jr.,  
RALPH L. FREEMAN.







TALKING MACHINE,  
# 1,165,414-----E.R.Johnson & J.C.English,  
Patented-December 28, 1915.  
Filed-July 10, 1909.

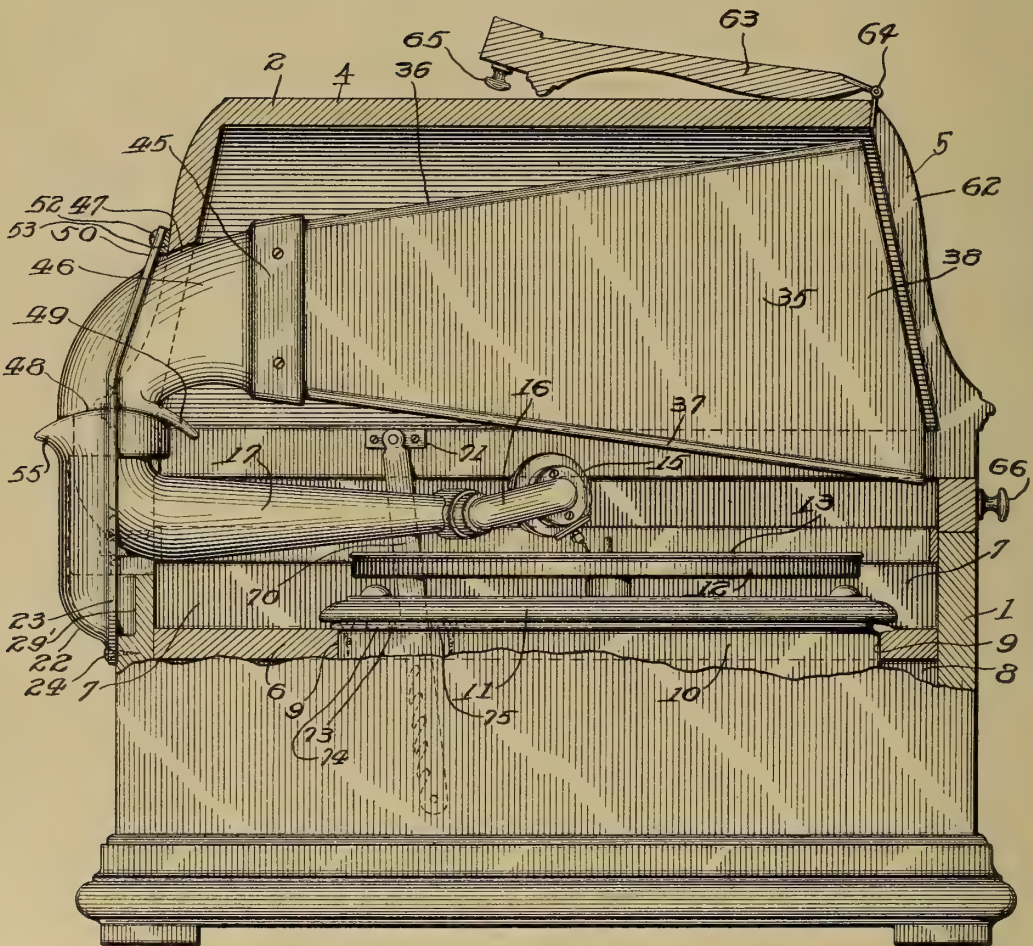
E. R. JOHNSON & J. C. ENGLISH.  
TALKING MACHINE.  
APPLICATION FILED JULY 10, 1909.

1,165,414.

Patented Dec. 28, 1915.

4 SHEETS—SHEET 1.

*Fig. 1.*



WITNESSES

*W. J. Hartman.*

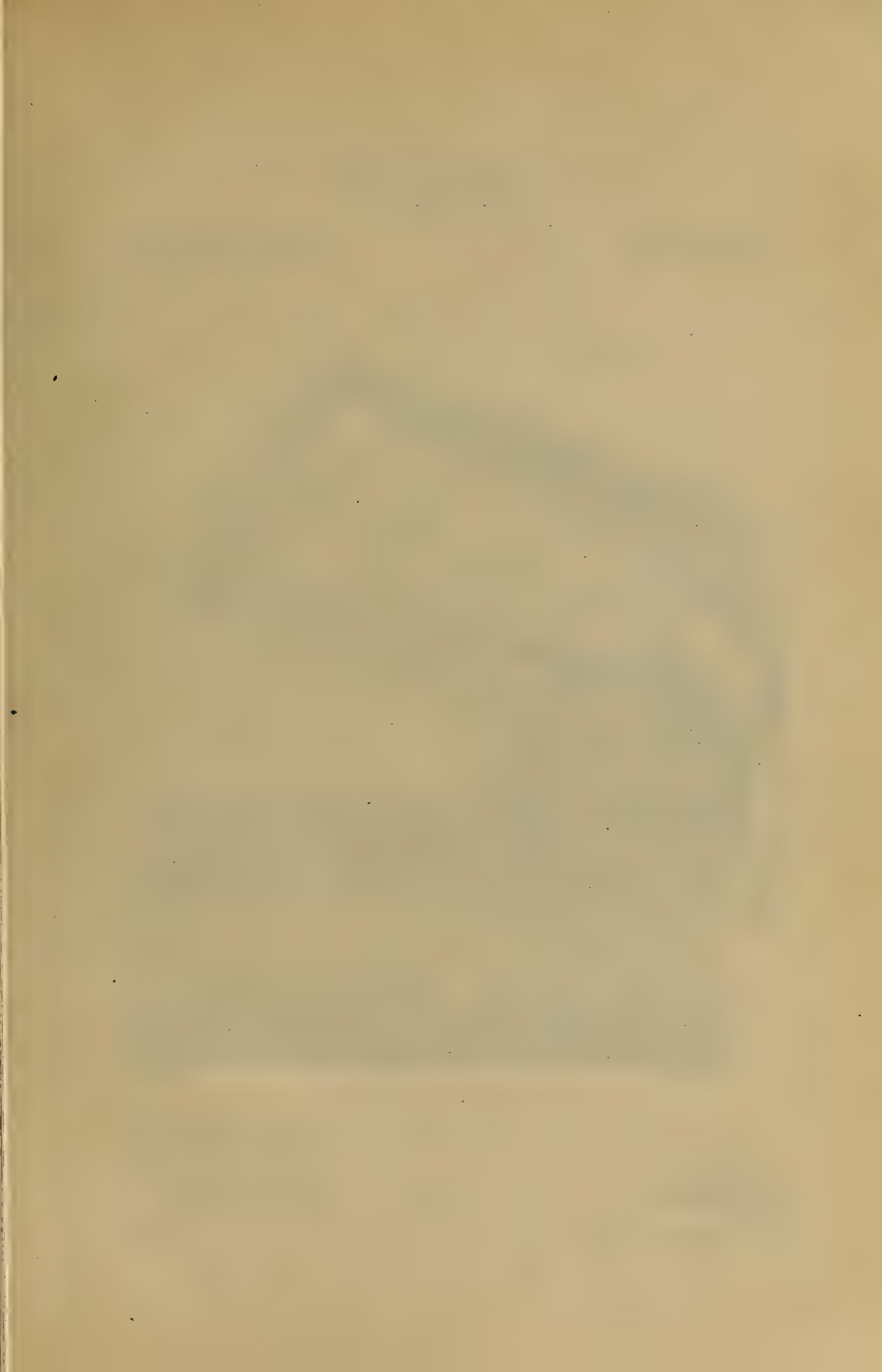
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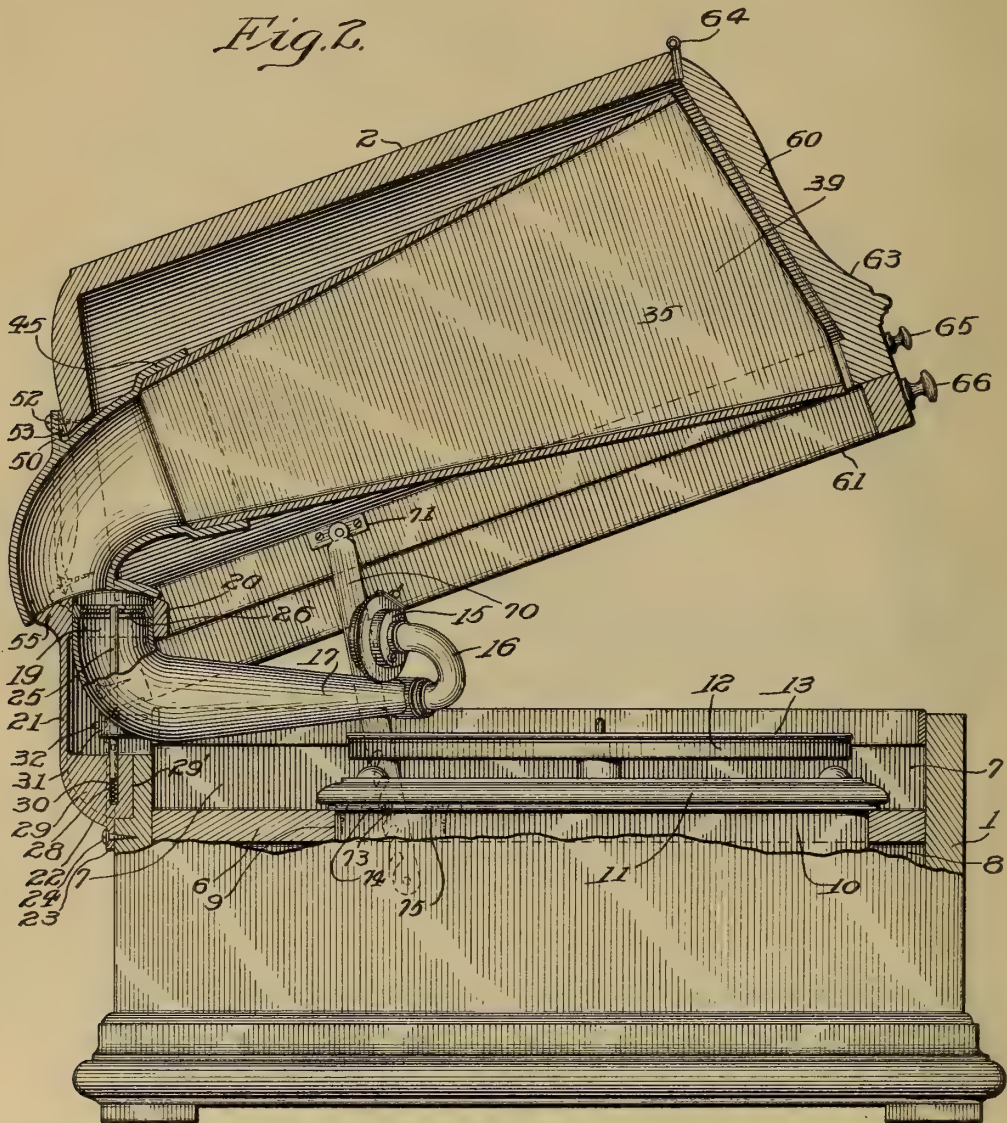


E. R. JOHNSON & J. C. ENGLISH,  
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4 SHEETS—SHEET 2.



WITNESSES

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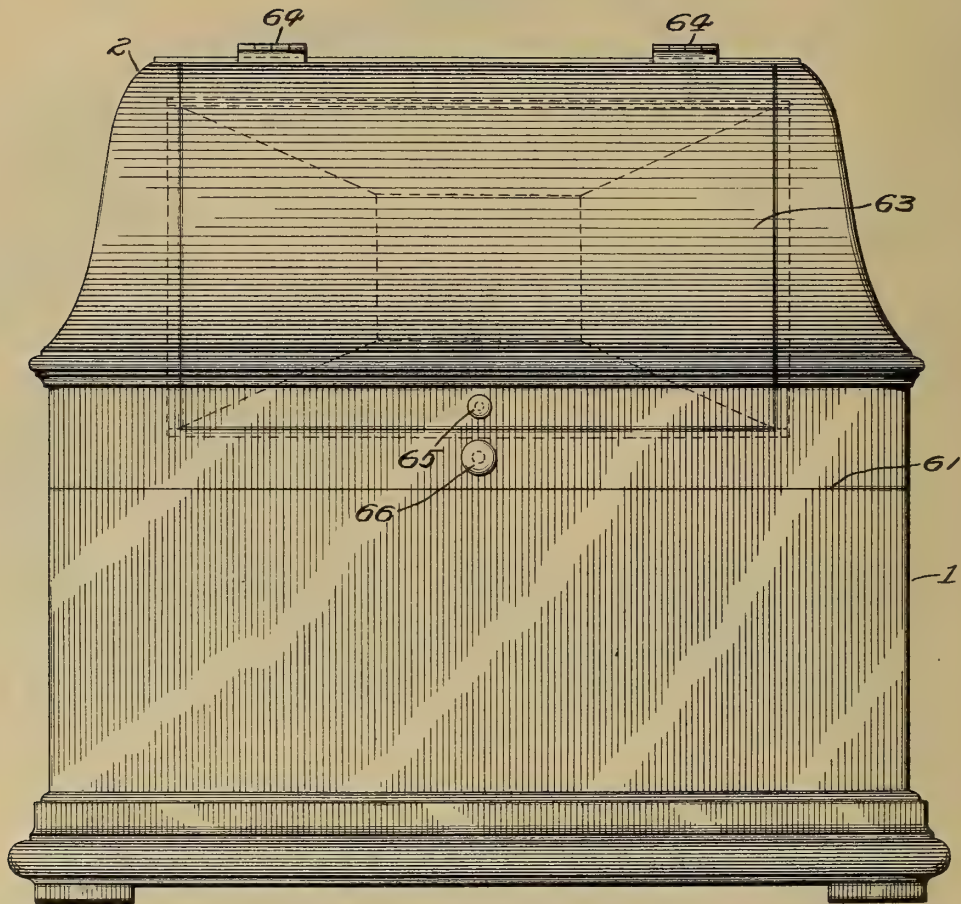


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APPLICATION FILED JULY 10, 1909.

1,165,414.

Patented Dec. 28, 1915.  
4 SHEETS—SHEET 3.

*Fig. 3.*



WITNESSES  
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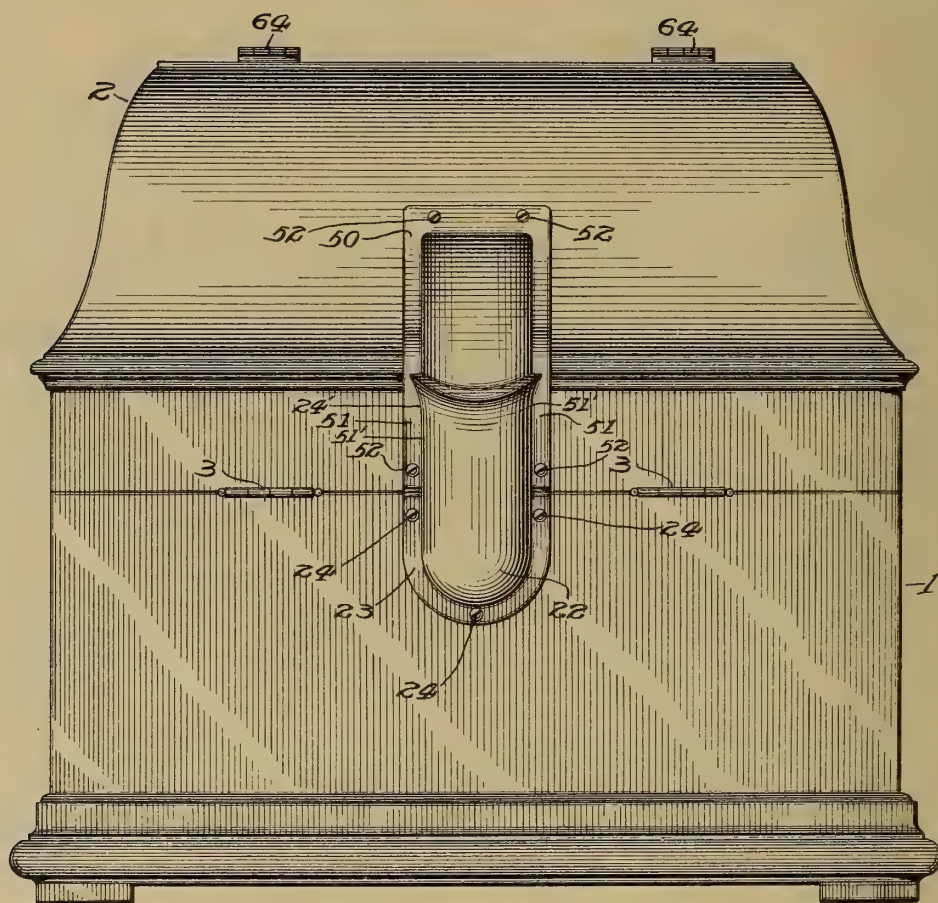


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APPLICATION FILED JULY 10, 1909.

1,165,414.

Patented Dec. 28, 1915.  
4 SHEETS—SHEET 4.

*Fig. 4.*



WITNESSES  
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*1st time filed*

ATTORNEY

# UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, AND JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## TALKING-MACHINE.

1,165,414.

Specification of Letters Patent.

Patented Dec. 28, 1915.

Application filed July 10, 1909. Serial No. 506,866.

*To all whom it may concern:*

Be it known that we, ELDRIDGE R. JOHNSON and JOHN C. ENGLISH, both citizens of the United States, and residents of Merion, county of Montgomery, State of Pennsylvania, and Camden, county of Camden, and State of New Jersey, respectively, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming part of this specification.

The main objects of this invention are, to provide an improved compact talking machine including a cabinet, and sound reproducing means and sound amplifying means inclosed thereby; to provide an improved talking machine having a cabinet, a record support and actuating mechanism in the cabinet, and an amplifier secured to the outside of the cabinet and projecting within the cabinet over the record support; to provide a talking machine having a cabinet comprising a base and a cover therefor, a record support, actuating mechanism and sound reproducing means carried by the base, and amplifying means carried by the cover; to provide a talking machine including a cabinet having a movable cover and a door or movable closure carried by the cover; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary side elevation, partly in vertical longitudinal section of an inclosed talking machine constructed in accordance with this invention, showing the parts in operative position; Fig. 2 a similar fragmentary side elevation partly in longitudinal vertical section, but showing the parts in an inoperative position; Fig. 3 a front elevation of the same, showing the cabinet closed; and Fig. 4 a rear elevation of the same.

Referring to the drawings, one embodiment of this invention comprises a casing or cabinet having a body portion 1 open at its upper end, and provided with a cover 2 superimposed thereon and hinged thereto as at 3 forming a closure for the upper end of the body portion 1. The cover comprises

a top 4 having a downwardly flaring rim 5 forming the sides thereof. The body of the cabinet is divided by a horizontal partition 6 into an upper compartment 7 and a lower compartment 8. This partition is provided with a rectangular aperture 9 in which rests a motor casing 10 containing any suitable actuating mechanism (not shown) for actuating a disk record support 12, which is mounted on the top 11 of the motor casing 8 and within the upper compartment 7 of the cabinet, and which is adapted to hold any suitable disk sound record 13.

Arranged above the record support 12 and in position to cooperate therewith, is the usual sound box 15, which is mounted in a well-known manner upon one end of a U-shaped tube 16 the other end of which is pivotally supported by the free smaller end of a tapering tubular sound box arm or tone-arm 17, which extends rearwardly from the U-shaped tube 16 in a substantially horizontal plane throughout the greater portion of the length of the arm. The larger end of the tone-arm is curved upwardly through an arc of about 90 degrees and fits rotatively within a cylindrical aperture 19 provided therefor in the upper end 20 of a vertical fixed bracket 21 which projects rearwardly from the outer vertical surface of the rear wall of the body of the cabinet and extends above and below the plane of the upper edge of the body of the cabinet. Below its upper end 20 the fixed bracket 21 is substantially semi-cylindrical in shape throughout the greater portion of its length and terminates in a rounded lower end 22. The bracket is arranged so that the convex surface of the semi-cylindrical portion projects outwardly from the plane of the outer vertical surface of the rear wall of the body of the cabinet, and the bracket is bordered by a substantially flat U-shaped flange 23 integral therewith which is secured to the rear vertical surface of the rear wall of the body of the cabinet by means of screws 24 or other suitable fastening devices. The ends of this flange terminate flush with the upper edge of the back wall of the body portion of the cabinet and are beveled to permit of the opening of the cover. The inner surface of



the bracket is concave or suitably recessed to receive the larger end of the sound box arm and to permit of the necessary movement thereof, and the back of the cabinet is also suitably recessed for the same purpose. The lower edge of the rear side of the cover is recessed as at 24' to fit snugly around the sides of that portion of the bracket that projects above the plane of the body of the cabinet to permit of the movement of the cover and this recess is extended upwardly to form a recess for an elbow, as will be described hereinafter.

For rotatably holding the sound box arm 17 in position, a vertical pivot 25 is rotatably secured at its upper end centrally in a spider 26, which fits snugly within the cylindrical opening 19 of the bracket 21, and the lower end of the pivot is rotatably seated in a suitable socket 28 in a lug 29 integral with the lower end of the bracket which projects inwardly and terminates in a recess 29' provided therefor in the rear side of the body of the cabinet. A spiral spring 30 is interposed between the lower end of the pivot and the lower end of the socket to provide a yielding support for the pivot. The pivot passes through a lug or sleeve 31 projecting downwardly from the sound box arm and integral therewith, and the sound box arm is held in a fixed position in respect to the pivot by means of a set screw 32 which is threaded in the lug 31 and engages against the pivot. The sound box arm is thus mounted to swing in a fixed horizontal plane about a fixed vertical axis.

The tapering tubular sound box arm 17 may be considered as forming the neck or smaller end of a sectional sound amplifier, the body or major portion 35 of which is movable with respect to the neck. This body 35 is preferably rectangular and oblong in transverse section and comparatively flat, comprising two substantially flat sounding boards 36 and 37, forming the top and bottom respectively of the body, and two substantially flat vertically arranged boards 38 and 39 forming the sides of the body. The top and bottom sounding boards diverge slightly forwardly and the side boards of the amplifier also diverge forwardly but to a greater degree than the top and bottom. These sounding boards are free at all times from contact with any part of the cabinet. The inner ends of these four boards of the body of the amplifier are snugly fitted within a transversely rectangular oblong socket 45 formed by the larger inner end of a hollow rigid longitudinally tapering curved elbow 46. The rear or smaller portion of the elbow 46 extends through a recess 47 provided therefor in the lower edge of the rear end of the cover 2 of the cabinet, and curves downwardly preferably through an

arc of about 90 degrees and terminating in a cylindrically concave end 48 substantially circular in transverse section, which has projecting inwardly therefrom a shield 49, the lower surface of which forms a continuation of the cylindrical concave end of the elbow.

The portion of the elbow which projects downwardly through the back of the cover is inclosed above and upon its opposite sides by a flange 50, integral therewith upon the outside of the rear face of the back of the cover and inclined to conform to the general contour of the outside of the cover. This flange has downwardly projecting end portions or arms 51 which embrace the sides of that part of the cooperating bracket 21 which projects above the body of the cabinet, the inner edges 51' of these arms conforming to the shape of the sides of the bracket, and the lower ends of these arms being beveled to meet the joint between the cover and the body of the cabinet to permit of the opening of the cover. The flange 50 is rigidly secured to the outside of the rear end of the cover by means of screws 52 or other suitable fastening devices, a suitable strip or strips 53 being interposed between the flange and the adjacent surface of the cover wherever necessary to form a suitable seat for the flange.

The axis of curvature of the concave end of the elbow 46 and the convex end of the bracket 21 is co-incident with the axis of movement of the cover, so that when the cover is moved about its hinges the concave surface of the elbow will slide over the convex surface of the bracket, the elbow remaining in communication with the sound box arm 17. The shield 49 upon the elbow 46 acts as a closure for the inner portion of the cylindrical opening 19 leading to the sound box arm, when the body of the amplifier is in its elevated position, and the upper end of the bracket 21 is provided with a rearward extension 55 to act as a closure for the rear portion of the lower end of the elbow when the elbow is thus elevated. By this construction the body 35 of the amplifier is rigidly supported entirely at its smaller end and from the outside of the cover by the curved elbow 46 which is rigid with the cover, and the body of the amplifier thus moves in unison with the cover. The delivery end of the amplifier terminates in close proximity to the front side 60 of the cover, conforming in shape to the inner surface of the front side of the cover, and leaving an annular opening of substantially uniform width between the end of the amplifier and the inner surface of the cover, and is spaced above the plane of the lower edges of the cover.

To permit sound waves to issue from the amplifier through the cover, the front side



of the cover is provided with a substantially rectangular oblong opening 62 of substantially the same dimensions as the outside dimensions of the delivery end of the amplifier, and this opening 62 is provided with a movable door or closure 63, the upper edge of which is connected by hinges 64 to the top of the cover. This door when closed entirely fills the opening 62 in the cover and prevents sounds from issuing directly therethrough. The door 63 is provided upon the lower portion of its front side with a knob 65 for operating the door. The cover 2 is also provided with a knob 66 upon the lower portion of its front side below the door 63 whereby the cover may be raised or lowered.

For supporting the cover 2 in any desired position about its hinges a bar 70 is pivoted at one end upon a plate 71 secured to the inner surface of one side of the cover, and is provided adjacent its opposite end and upon its under edge with notches adapted to receive a pin or crossbar 73 which extends across an aperture 74 in a plate 75 attached to the upper side of the horizontal partition 6, the partition being provided with an aperture registering with the aperture in the plate to permit the bar 70 to pass therethrough.

The space within the cabinet surrounding the amplifier is always in communication with the interior of the amplifier through the opening between the delivery end of the amplifier and the cover, and when the cover or the door 63 in the cover is open the sounds set up in the space surrounding the amplifier may pass outwardly from the cabinet mingling with the sounds issuing from the interior of the amplifier.

The inner surfaces of the top and sides of the cover form a downwardly flaring reflector which may be inclined to direct the sound waves set up in the air within the cabinet surrounding the body of the amplifier forwardly from the cabinet.

When it is desired to operate the machine, the cover is first raised, carrying the body portion of the amplifier therewith, and is held in suitable position by means of the notch bar 70. A record is then placed upon the record support, whereupon the sound box is swung into engagement with the record and the actuating mechanism is then released. The cover may then be closed bringing the body of the amplifier into a substantially horizontal position, and the door in front of the delivery end of the amplifier may be opened to permit the sound to pass through the cabinet. The door may be left closed when it is desired to muffle or soften the reproduction, or the door might be held partially open by any suitable means if preferred, to modulate the reciprocation as desired. A further modulation of the repro-

duction might be made by operating the machine with the cover partially opened and with the door of the cover either opened or closed. When not in operation, the machine is kept with the cover of the cabinet and the door carried by the cover both closed, and with the sound box inverted upon its arm and swung to one side of the body of the amplifier.

Although only one form of this invention is here illustrated, it is obvious that the invention is not limited to the particular form shown, as many changes might be made in the construction without departing from the spirit of this invention or the scope of the appended claims.

Having thus described our invention, we claim and desire to protect by Letters Patent of the United States:—

1. The combination with a cabinet comprising a body and a movable cover, of a record support mounted within said body independently of said cover, sound reproducing means supported by said body independently of said cover and arranged to cooperate with said record support, sound amplifying means supported by said cover, and means extending outside of said cabinet and comprising a hollow stationary member and a hollow movable member slidably engaging said stationary member for transmitting sound waves from said sound reproducing means to said amplifying means.

2. The combination with a cabinet comprising a body and a movable cover, of a record support mounted in said body, a bracket rigidly secured to the outside of said body, sound reproducing means rotatably mounted in said bracket and projecting in said cabinet to cooperate with said record support, a hollow member rigidly secured to the outside of said cover, and communicating with said sound reproducing means, and sound amplifying means supported by said member within said cabinet.

3. The combination with a cabinet having a body and a movable cover, of sound amplifying means having a delivery end within said cover carried thereby but out of contact therewith.

4. The combination with a cabinet comprising a body and a cover pivoted thereto, of a bracket secured to said body and having a convex cylindrical end coaxial with the axis of movement of said cover, a hollow elbow secured to said cover and having a cylindrical end coaxial with the cylindrical end of said bracket, sound reproducing means carried by said bracket and communicating with said elbow, and sound amplifying means carried by said elbow within said cabinet.

5. The combination with a cabinet having



a body and a cover pivoted thereto, of a bracket secured to the outside of the rear side of said body and projecting upwardly from said body, a hollow elbow secured to the outside of said cover and coöperating with the upper end of said bracket, sound reproducing means supported by said bracket and extending within said cabinet and communicating with said elbow, and sound amplifying means supported within said cover by said elbow.

6. The combination with a cabinet comprising a body having a movable cover provided with a rim flaring toward said body, of amplifying means having a delivery end within said cover and rigid therewith, but entirely spaced therefrom.

7. The combination with a cabinet comprising a body and a cover hinged thereto, of a bracket extending upon the outside of said body and provided with a flange integral therewith and rigidly secured to the outside of said body, a hollow elbow arranged above said bracket to coöperate therewith and having a flange integral therewith secured to the outside of said cover, sound reproducing means supported by said bracket and extending within said cabinet, and sound amplifying means supported by said elbow and extending within said cover.

8. The combination with a cabinet comprising a body having a cover hinged thereto, of a bracket secured to said body and extending outside of said cabinet and provided with a cylindrical end coaxial with the axis of movement of said cover, a hollow elbow secured to said cover and extending outside of said cabinet and having a cylindrical end coaxial with said cylindrical end of said bracket, and coöperating therewith, sound reproducing means, and sound amplifying means extending within said cabinet and communicating therewith through said bracket and said elbow.

9. In a talking machine the combination with a fixed member, provided with a cylindrical upper end, the geometrical axis of said cylindrical end being substantially horizontal, and said upper end being provided with a vertical opening therein, a tubular sound box arm having an upwardly turned end projecting rotatably within said opening, a spider fitting snugly within said opening above said end of said arm, and a vertical pivot having its upper end mounted in said spider extending through said arm, supporting said arm, a hollow elbow having a downwardly turned cylindrical end coaxial with the end of said bracket and coöperating therewith, and amplifying means supported by said elbow.

10. The combination with a tubular sound conveying member, of a hollow sound conveying member mounted to swing across the

end of said tubular member, a shield projecting laterally from one of said members, and a corresponding projection extending in the opposite direction upon the other of said members, said shield and said projection acting as closures for portions of said members as one member is moved with respect to the other.

11. The combination with a cabinet, comprising a body and a cover hinged to said body and invertible with respect thereto, of a record support mounted in said body, a sound box arm extending outside of said cabinet and arranged to coöperate with said record support, and sound amplifying means carried by said cover and arranged to coöperate with said sound box arm, said cover being movable independently of said sound box arm.

12. The combination with a cabinet, comprising a body portion and a cover pivoted thereto, of sound reproducing means supported by said body independently of said cover, and a hollow elbow projecting outside of said cover in communication with said sound reproducing means, and sound amplifying means supported within said cover by said elbow.

13. The combination with a cabinet comprising a body and a cover arranged to oscillate with respect to said body about a fixed axis, of a bracket extending outside of and secured to said body, a hollow elbow secured to said cover and coöperating with said bracket, sound reproducing means carried by said bracket and communicating with said elbow, and sound amplifying means carried by said elbow within said cabinet.

14. The combination with a cabinet, of a record support in said cabinet, sound reproducing means and sound amplifying means extending in said cabinet above said record support, and means of communication between said sound reproducing means and said sound amplifying means extending outside of said cabinet and comprising a fixed hollow member and a movable hollow member communicating therewith arranged to swing with respect thereto about a fixed substantially horizontal axis.

15. The combination with a cabinet comprising a stationary body and an invertible cover hinged thereto, of a sound amplifier having a delivery end carried by said cover, sound reproducing means within said body, and means of communication between said sound reproducing means and said delivery end, extending outside of said cabinet.

16. The combination with a cabinet comprising a stationary body and a movable cover, of a sound amplifier having a delivery end carried by said cover, sound reproducing means within said body and supported independently of said cover, and means of



communication between said sound reproducing means and said delivery end, extending outside of said cabinet, said cover being mounted to oscillate through an angle  
5 of more than ninety degrees.

17. A talking machine comprising a hollow fixed member having a cylindrical end wall and a hollow member pivoted coaxially with said cylindrical end wall and communicating therewith, sound amplifying means carried by said movable member, and sound reproducing means carried by said fixed member.  
10

18. A talking machine comprising a fixed member having a cylindrical end wall, a member pivoted coaxially with said cylindrical end wall and cooperating therewith, sound amplifying means carried by said movable member, and sound reproducing means carried by said fixed member and movable on a fixed axis transverse to the axis of said cylindrical end wall of said fixed member.  
15 20

19. The combination with a cabinet having a body and a movable cover, of sound amplifying means having a delivery end within said cover and fixed with respect thereto but out of contact therewith, and a door carried by said cover opposite said delivery end.  
25 30

20. The combination with a cabinet comprising a body portion and a cover movable with respect thereto, of hollow sound conveying means carried by said body portion, and hollow sound conveying means carried by said cover and slidably engaging said first mentioned means and communicating therewith.  
35

21. The combination with a cabinet comprising a body portion and a cover movable with respect thereto upon a fixed axis, of hollow sound conveying means carried by said body portion, and hollow sound conveying means carried by said cover and slidably engaging said first mentioned means and communicating therewith.  
40 45

22. The combination with a cabinet comprising a body and a movable cover, of sound reproducing means in said cabinet, said cabinet being provided with a sound conduit extending outside of said cabinet and through said cover, and communicating with said sound reproducing means, said cover being mounted to oscillate through  
50 55 an angle of more than ninety degrees.

23. A talking machine, comprising a cabinet including a body portion, and a movable cover therefor, a hollow member fixed on said body portion and having a cylindrical end wall, and a hollow member carried by said cover, and movable co-axially with said cylindrical wall and communicating with said first mentioned hollow member, sound reproducing means carried by  
60

and communicating with said first mentioned hollow member, and sound amplifying means communicating with said second mentioned hollow member. 65

24. In a talking machine, the combination with a cabinet comprising a body portion and a cover hinged thereto, of sound reproducing means supported by said body independently of said cover, and a hollow elbow secured to and projecting outwardly from said cover in communication with said sound reproducing means, and sound amplifying means supported within said cover by said elbow and communicating therewith. 70 75

25. In a talking machine, the combination with a cabinet comprising a body portion and a movable cover, of sound reproducing means arranged within said cabinet, sound amplifying means carried by and extending within said cover, and means of communication between said sound reproducing means and said sound amplifying means and comprising two hollow members, each projecting outside of said cabinet, one of said members being in slidable engagement with the other. 80 85 90

26. In a talking machine, the combination with a cabinet comprising a body and a hollow movable cover, of sound reproducing means in said cabinet and sound conveying means leading from said sound reproducing means outwardly from said cabinet and inwardly through an exterior wall of said cover, said sound conveying means including a stationary hollow member, and a hollow member secured to said cover and slidably engaging said stationary member and communicating therewith. 95 100

27. In mechanism of the class described, the combination with a talking machine, including a sound conveyer, of a relatively movable cover for said talking machine, and a sound amplifier attached at its smaller end to said cover, but otherwise out of contact therewith, said amplifier being adapted to cooperate with said conveyer when said cover is closed, substantially as described. 105 110

28. The combination with a hollow sound conveying member, of a hollow sound conveying member mounted to swing across said first mentioned member, a shield projecting from one of said members, and a corresponding projection arranged opposite to said shield upon the other of said members, said shield and said projection acting as closures for portions of said members respectively, as one of said members is moved with respect to the other one of said members. 115 120

29. The combination with a sound conveying member provided with an outlet, of a sound conveying member provided with an inlet and arranged to move with respect 125

to said first mentioned member to cause said inlet to traverse said outlet, a shield projecting from one of said members, and a corresponding projection arranged opposite to said shield upon the other of said members, said shield and said projection acting as closures for said outlet and said inlet respectively as one of said members is moved with respect to the other of said members.

30. In a talking machine, the combination with a cabinet and a hollow sound conducting member mounted on said cabinet stationary with respect thereto having a cylindrical end wall, of a hollow sound conducting member movable with respect to said first mentioned member and communicating therewith and having a cylindrical end wall coöperating with said first mentioned end wall, sound amplifying means carried by one of said members, and sound reproducing means carried by the other of said members.

31. The combination with a cabinet comprising a body portion and a cover arranged to oscillate with respect thereto, of sound reproducing means supported by said body portion independently of said cover, and a hollow elbow projecting outside of said cover in communication with said sound reproducing means, and sound amplifying means supported within said cover by said elbow.

32. The combination with a cabinet having a body and a cover arranged to oscillate with respect thereto about a fixed axis, of sound amplifying means having a delivery end projecting freely within said cabinet and movable coaxially with said cover, and a door carried by said cover opposite said delivery end.

33. The combination with a cabinet, comprising a body portion and a cover movable with respect thereto about a fixed axis, of hollow sound conveying means carried by said body portion independently of said cover, and hollow sound conveying means communicating with and slidably engaging said first mentioned means and movable coaxially with said cover.

Signed by the said ELDRIDGE R. JOHNSON at Camden, State of New Jersey, this 9th day of July, 1909.

ELDRIDGE R. JOHNSON.

Witnesses:

RALPH LINDSAY FREEMAN,

FRANK BARCLAY MIDDLETON, Jr.

Signed by the said JOHN C. ENGLISH at Camden, State of New Jersey, this 9th day of July, 1909.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

STOP FOR TALKING MACHINES,  
# 1,165,679-----T. W. Kirkman,  
Patented-Dec. 28, 1915.  
Filed-May 17, 1912.

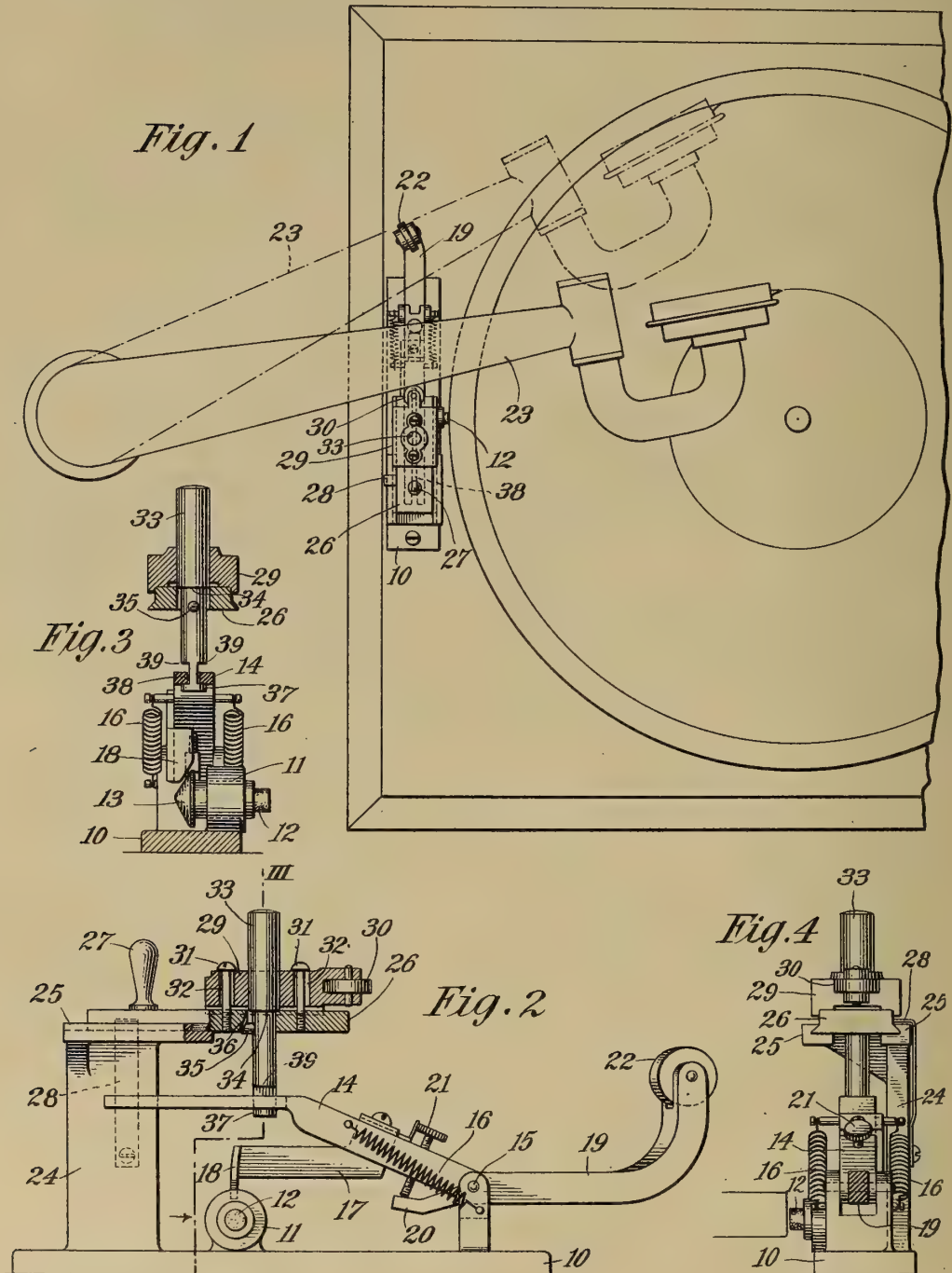


T. W. KIRKMAN.  
STOP FOR TALKING MACHINES.  
APPLICATION FILED MAY 17, 1912.

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Patented Dec. 28, 1915.

2 SHEETS—SHEET 1.



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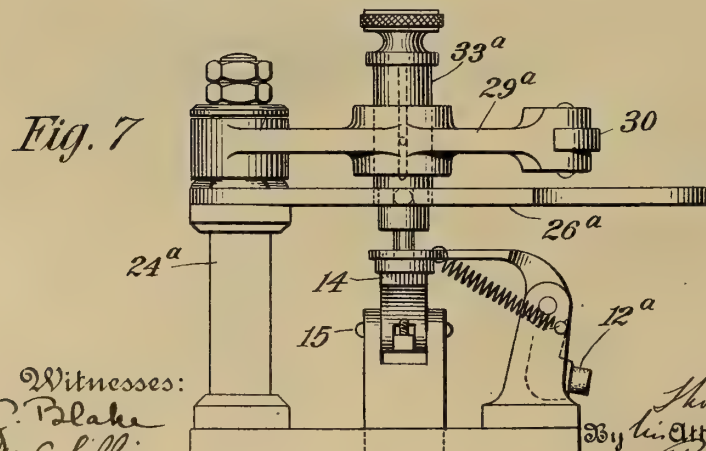
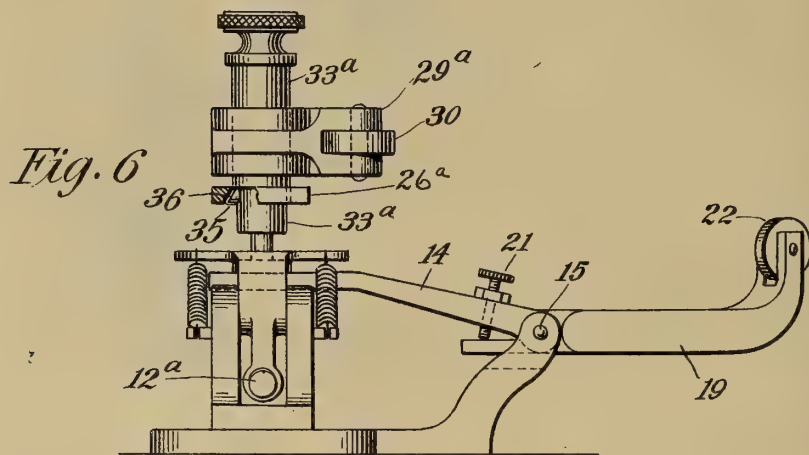
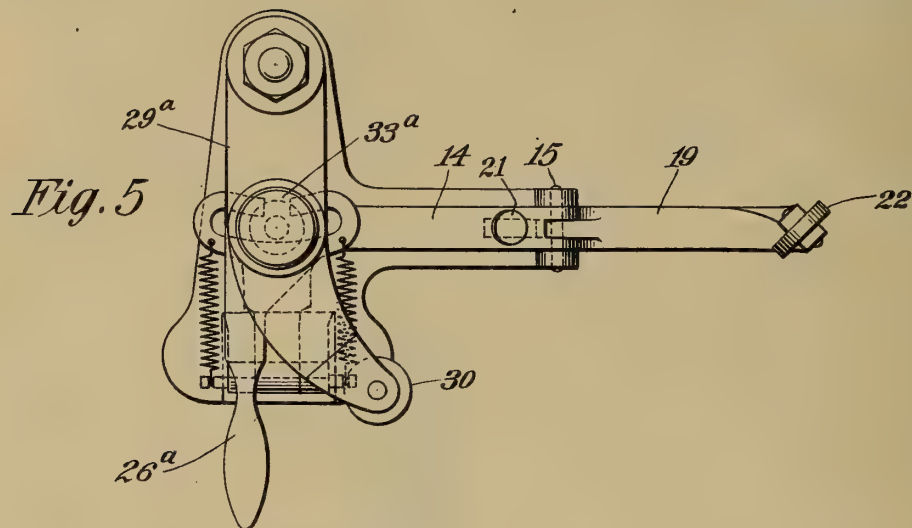
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1,165,679.

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Patented Dec. 28, 1915.  
2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

THOMAS W. KIRKMAN, OF NEW YORK, N. Y., ASSIGNOR TO STANDARD GRAMAPHONE APPLIANCE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## STOP FOR TALKING-MACHINES.

1,165,679.

Specification of Letters Patent. Patented Dec. 28, 1915.

Continuation of application Serial No. 684,720, filed March 19, 1912. This application filed May 17, 1912. Serial No. 697,936.

### *To all whom it may concern:*

Be it known that I, THOMAS W. KIRKMAN, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Stops for Talking-Machines, of which the following is a specification.

This invention relates to automatic stops for sound-reproducing machines, and among its objects are the following: first, to provide a simple, compact and reliable attachment for existing machines, and especially those of the flat-disk type, secondly to simplify the operation of setting the stop to release the record-support at the beginning of a selection, and thirdly to provide means for quickly and easily setting the device so as to control the time of its stopping action to correspond with the point at which the selection ends.

A further object of my invention is to furnish improved means whereby the brake-controlling latch may be automatically set in brake-releasing position by the manual movement of the reproducer to position it at the beginning of the record groove, one of the advantages attained being that the re-setting mechanism does not necessarily involve any friction or pressure on the reproducer arm or other parts of the reproducing structure during the performance of a selection, and is so combined with the stop as to permit the positioning adjustment of the latter, and the tripping of said stop with very slight exertion of power.

The present application is a continuation of my application Serial No. 684,720, filed March 19, 1912.

Of the accompanying drawings, Figure 1 represents a plan view of a talking machine provided with automatic stop mechanism constructed according to my invention. Fig. 2 represents an elevation of the stop mechanism, partly in section. Fig. 3 represents a cross-section on the line III—III of Fig. 2. Fig. 4 represents an end elevation and section looking in the opposite direction from Fig. 3. Fig. 5 represents a plan view showing a modification. Fig. 6 represents a side elevation thereof. Fig. 7 represents an end elevation.

Referring at first to Figs. 1 to 4 inclusive, 10 indicates a base having a bearing 11 in which is mounted a slidable brake stud 12 having a cam 13 on its rear or outer end.

14 is a brake-operating lever pivoted at 15 on suitable standards on the base 10 and adapted to be depressed by its weight and a pair of springs 16, said lever carrying a spring arm 17 provided with a cam 18 adapted to act against the cam on the rear end of the brake stud.

19 is a re-setting arm hung on pivot 15 and having a projection 20 engaged by an adjusting screw 21 on the lever 14, so that the angular relation of said lever and arm may be varied, the re-setting lever having a roller 22 at its outer end adapted to be engaged by the reproducer arm 23 when the latter is carried outwardly to the beginning of a selection.

24 is a standard formed with dove-tailed horizontal guides 25 in which is mounted a normally fixed but adjustable keeper slide 26 provided with a knob or handle 27, said slide being laterally pressed against by a leaf spring 28 to furnish friction.

On the keeper slide 26 is mounted a latch-tripping slide 29 having a roller 30 at its end, in a position to be encountered by the reproducer arm at the completion of a selection, slide 29 being suitably guided to move longitudinally on slide 26 and loosely held thereon by pins 31 operating in holes 32 in the upper slide which allow some play to the latter.

33 is a vertically-movable latch bolt having a sliding fit in a guide bearing in the slide 29 and extending loosely through an aperture in the keeper slide 26, said latch bolt having a shoulder 34 adapted to take over the edge of the hole in the keeper plate 26 through which the bolt passes, said bolt also having a cam pin 35 operating against a cam incline 36 when the bolt is forced into its uppermost position, whereby its shoulder 34 is caused to overlap the keeper slide and retain the bolt in elevated position, such lateral movement and engagement being effected by carrying the bolt upwardly slightly beyond its catching position, and then allowing it to descend until the shoulder 34 rests on the keeper slide.



The lower end of the latch bolt is formed with a T whose head 37 engages the under side of the lever 14 and whose neck occupies an elongated slot 38 which permits the latch bolt to remain in engagement with lever 14 when the keeper slide 26 is adjusted to position the stop with respect to the completion of the record groove, said slot being open-ended, as seen in dotted lines in Fig. 1, to permit the assembling of the device. The upper side of lever 14 is adapted to engage with shoulders 39 on the latch bolt to elevate the latter. In operating this embodiment of my invention, the reproducer arm 23 is placed as represented in full lines in Fig. 1, so that the needle will be in or about the last or innermost turn of the record groove, and then the keeper slide 26 is pushed by means of its handle 27 to bring the roller 30 against the side of the reproducer arm. Then when said reproducer arm is carried outwardly to or somewhat beyond the dotted line position indicated in Fig. 1 preparatory to positioning the needle in the outer portion of the record groove it acts against roller 22 to depress the resetting arm 19 and raise the lever 14 and the spring arm 17 carried thereby, thereby releasing the brake 12. The brake-stud slides freely in its guide 11, and when the pressure of spring-arm 17 is removed, the turn-table is thereby allowed to rotate. The lever 14 raises the latch bolt 33 until its shoulder 34 takes over the keeper slide 26, the bolt being forced laterally by the cam members 35, 36 and allowed to descend into latching position as described, and this slight longitudinal movement of the slide 29 produced by the lateral movement of the bolt 33 will cause the roller 30 to be positioned so that it will be encountered by the reproducer arm several turns of the record groove before the end of the latter, which turns being blank ones on the ordinary record, will allow the necessary margin of movement to the reproducer arm at the completion of the selection to dislodge the bolt 33 from the keeper slide 26 and allow lever 14 to drop with the assistance of the springs 16 and cause the brake 12 to be set by the action thereon of cam 18.

In Figs. 5, 6 and 7, I have represented a modification in which 12<sup>a</sup> represents a pivoted brake-lever, 33<sup>a</sup> a vertically-movable latch bolt engaging one arm of said lever, 26<sup>a</sup> a keeper plate frictionally pivoted upon a post 24<sup>a</sup>, and 29<sup>a</sup> a latch-operating lever loosely pivoted on said post, other parts corresponding to those in Figs. 1 to 4 inclusive being designated by like reference characters, and the action of the members 14, 19 in re-setting the latch bolt being the same as above set forth.

I claim—

1. In a talking-machine stop, the combination of a braking element, a latch con-

trolling the same and adapted to be tripped by the movement of a traveling member to cause the setting of said element at the completion of a selection, and a keeper for holding said latch in a brake-releasing position, said keeper being adjustable to vary the point in the travel of said member at which the latch is tripped.

2. In a talking-machine stop, the combination of a brake, a latch controlling the same and adapted to be tripped by a traveling member, and an adjustably fixed keeper for holding said latch in a brake-releasing position, said keeper being adjustable in the direction of the catching and uncatching movement of said latch.

3. In a talking-machine stop, the combination of a brake, a latch controlling the same and adapted to be tripped by a traveling member, a fixed support, a keeper mounted thereon for holding said latch in its brake-releasing position and manually shiftable on its support to time the occurrence of the tripping action, and a frictional connection between said support and keeper to hold the latter at any adjustment.

4. In a talking-machine stop, the combination of a brake, a fixed keeper, and a latch controlling the brake and adapted to be held by said keeper in a brake-releasing position, said latch having a brake-setting and releasing movement, and a keeper-engaging and disengaging movement in a direction transverse to said brake-setting and releasing movement.

5. In a talking-machine stop, the combination of a brake, a fixed keeper, and a latch controlling the brake and adapted to be held by said keeper in a brake-releasing position, said latch having brake-setting and releasing movements in a substantially vertical direction, and keeper-engaging and disengaging movements in a substantially horizontal direction.

6. In a talking-machine stop, the combination of a brake having a substantially horizontal movement to engage and disengage the edge of a rotating member, a keeper, and a latch having a substantially vertical movement to set and release said brake and a substantially horizontal movement to engage and disengage with the keeper.

7. In a talking-machine stop, the combination of a brake, a vertically-movable latch-bolt weighted to fall by gravity and set said brake and adapted to be tripped by a traveling member, and a fixed keeper for holding said latch-bolt in an elevated position, the latch-bolt having a horizontal catching and uncatching movement with relation to the keeper.

8. In a talking-machine stop, the combination of a brake, a keeper, a latch having substantially vertical brake-setting and re-



leasing movements and substantially horizontal keeper-engaging and disengaging movements, and a horizontally-movable latch-tripping device adapted to be engaged by a traveling element.

9. In a talking-machine stop, the combination of a brake, a latch-keeper adjustable to time the occurrence of the tripping action, a latch-tripping device adapted to be engaged by a traveling element, and a brake-controlling latch forming a connection between said keeper and said device whereby the latch and latch-tripping device are shifted when the keeper is adjusted.

10. In a talking-machine stop, the combination of a brake, a horizontally-adjustable keeper, a horizontally-movable latch-bolt-tripping device mounted thereover and adapted to be engaged by a traveling element, and a vertically-movable latch-bolt controlling the brake and adapted to be held in raised position by said keeper, said latch-bolt laterally abutting the keeper and the tripping device in both directions of horizontal movement.

11. In a talking-machine stop, the combination of a brake, a horizontally-movable tripping device adapted to be engaged by a traveling element and having a latch-bolt guide, a horizontally-adjustable keeper having a latch-bolt aperture, and a vertically-movable latch-bolt controlling the brake and cooperating with said keeper, said bolt having a sliding fit in the guide and a loose fit in the aperture.

12. In a talking-machine stop, the combination of a trip-device adapted to be engaged by a traveling element, a latch-keeper adjustable therewith to time the occurrence of the tripping action, a brake stationarily mounted with respect to said members, and a brake-controlling latch connected with said trip-device and keeper and laterally shiftable with respect to said brake to allow for the said adjustment.

13. In a talking-machine stop, the combination of a brake element having a slot, a brake-controlling latch occupying said slot, a latch-keeper adjustable to shift the latch in said slot, and a tripping device for said latch adapted to be engaged by a traveling element.

14. In a talking-machine stop, the combination of a brake, a latch-keeper, a latch having a brake-setting and releasing movement and a keeper-engaging and disengaging movement, said latch adapted to be actuated by a traveling element, and means operated by carrying the latch in its brake-releasing movement beyond the catching position for shifting the latch onto the keeper.

15. In a talking-machine stop, the combination of a brake, a latch-keeper, a latch-tripping device adapted to be engaged by a traveling element, and a latch connected

with said device and controlling the brake, said latch having a cam engagement with said keeper whereby its brake-releasing movement sets the latch on the keeper.

16. In a talking-machine stop, the combination of a brake, a latch-tripping member adapted to be engaged by a traveling element, a latch-keeper adjacent thereto, and a latch-bolt controlling the brake and slidable transversely with respect to the movement of the latch-tripping member, said bolt having a cam adapted to engage the keeper and shift said bolt and member laterally to engage the bolt with the keeper at the limit of the brake-releasing movement of said bolt.

17. In a talking-machine stop, the combination of a brake, a latch controlling the same, a latch-tripping device adapted to be engaged by a traveling element, and a keeper engaging said latch and adapted to carry the same and the device into the position in which the latch is tripped, said keeper having an aperture between whose sides the latch is adapted to play with a slight lost motion in order that the lever may be given a further setting movement when the latch is engaged with said keeper.

18. In a talking-machine stop, the combination of a support having a guide, a keeper slide movable on said guide, a brake, a latch controlling said brake and adapted to be retained by the keeper slide in brake-releasing position, and a latch-operating slide mounted for movement on said keeper slide.

19. In a talking-machine stop, the combination of a support having a rectilinear guide, a keeper slide horizontally movable on said guide, a latch-operating slide movably supported on said keeper slide, a vertically-movable latch bolt working in a bearing in said latch-operating slide and movable therewith to engage and disengage said bolt with the keeper slide, and a brake controlled by said bolt.

20. In a talking-machine stop, the combination of a horizontally-slidable brake stud, a lever pivoted to move in a vertical plane and having a cam coacting with said brake stud, a latch having a rising and falling movement to control said lever, a keeper for holding said latch in retracted position, and a latch-tripping member.

21. In a talking-machine stop, the combination of a horizontally-movable brake, a lever movable in a vertical path and having a cam for operating said brake, a latch bolt having a vertical brake-operating movement and movable horizontally to adjust its tripping position and to engage it with or release it from the keeper, said latch bolt having a sliding connection with said lever, a horizontally-movable keeper adapted to adjust the tripping position of said latch



bolt, and a horizontally-movable latch-operating slide mounted on said keeper.

22. In a talking-machine stop, the combination of a brake, a vertically-movable latch controlling said brake and adapted to be tripped by the traverse of a traveling element at the completion of a selection, and a latch-setting lever pivoted on a horizontal axis and adapted to be operated by the manual return of said element for raising said latch to its brake-releasing position.

23. In a talking-machine stop, the combination of a brake, a rising and falling latch controlling said brake, a keeper to hold said latch in brake-releasing position, a latch-operating member adapted to be moved by the traverse of a traveling element for tripping said latch to set the brake at the completion of a selection, and a latch-setting lever pivoted on a horizontal axis and adapted to be operated by the manual return of said element for lifting said latch to its brake-releasing position.

24. In a talking-machine stop, the combination of a brake, a latch having a vertical brake-operating movement and a horizontal tripping movement, means whereby the elevation of said latch automatically retains it in brake-releasing position, a horizontally-movable latch-tripping member, and a latch-setting lever pivoted on a horizontal axis and adapted to be operated by the manual return of a traveling element.

25. In a talking-machine stop, the combination of a brake, a vertically-movable latch, a latch-keeper, a horizontally-movable latch-tripping member, and a lever pivoted

on a horizontal axis and having one arm connected with said latch and provided with brake-operating means and another arm provided with a contact member adapted to be engaged by a traveling part to re-set said latch.

26. In a talking-machine stop, the combination of a horizontally-movable brake, a lever pivoted to move in a vertical plane and having a cam to operate said brake and also having a contact member for engagement by the reproducer arm, a keeper slide movable horizontally, parallel to the plane of movement of said lever, a latch-operating slide movable horizontally on said keeper slide and adapted to be actuated by a traveling element, and a latch bolt movable vertically in said latch-operating slide and also movable horizontally therewith, said bolt engaging said lever and coacting with said keeper slide to automatically set the bolt in brake-releasing position when the bolt is raised.

27. In a talking-machine stop, the combination of a horizontally-sliding brake stud, a lever having a yieldingly-mounted cam for setting said brake stud, a latch controlling said lever, and latch-tripping means.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses, this 14th day of May, 1912.

THOMAS W. KIRKMAN.

Witnesses:

R. M. PIERSON,  
EDWARD E. BLACK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE WITH REPEAT  
ATTACHMENT,

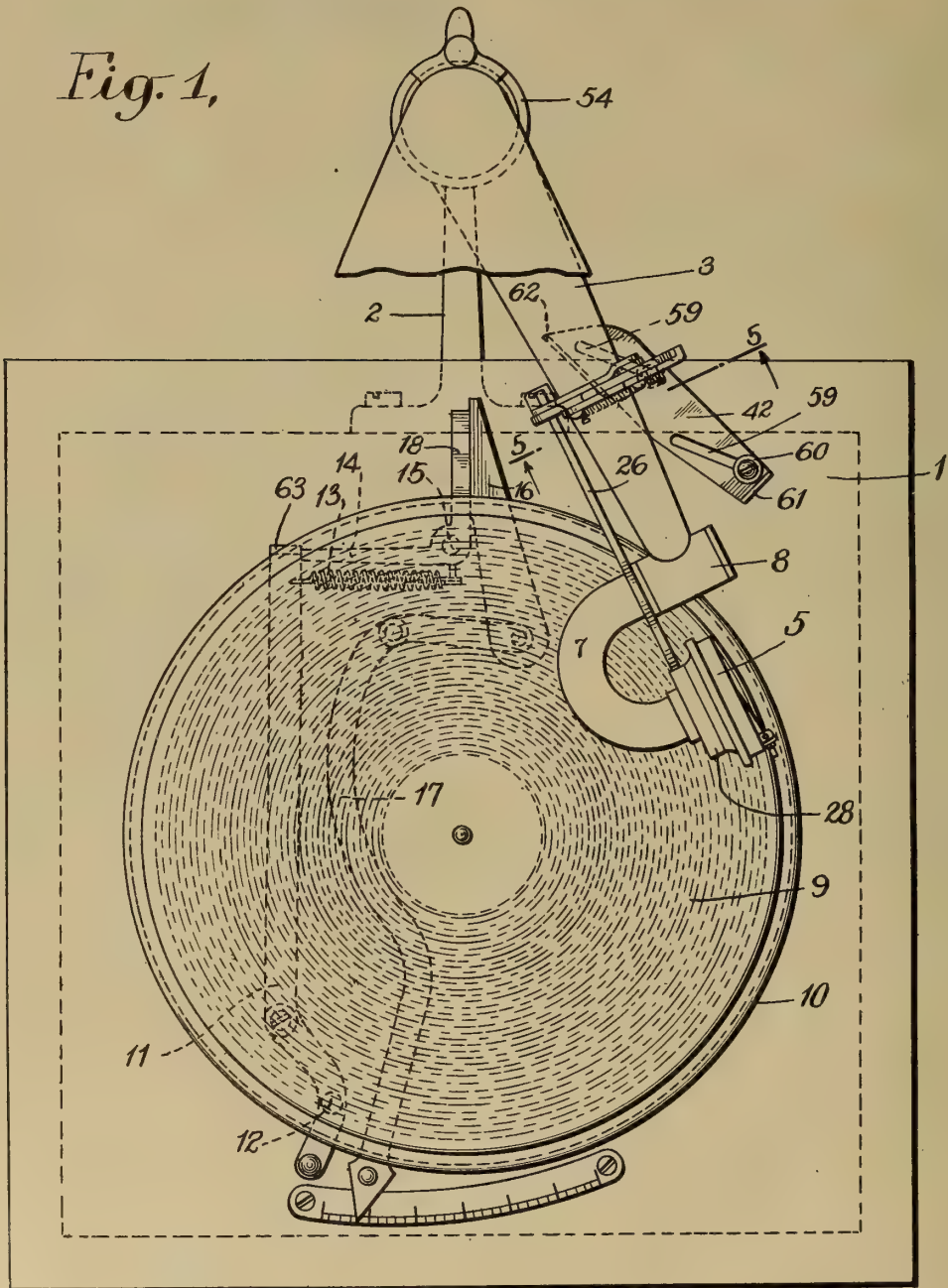
# 1,165,927-----D.M.Winans,  
Patented-December 28, 1915.  
Filed-July 17, 1915.

D. M. WINANS.  
TALKING MACHINE WITH REPEAT ATTACHMENT.  
APPLICATION FILED JULY 17, 1915.

1,165,927.

Patented Dec. 28, 1915.  
3 SHEETS—SHEET 1.

*Fig. 1.*



INVENTOR

*D. M. Winans*  
BY  
*J. C. Edwards*  
ATTORNEY



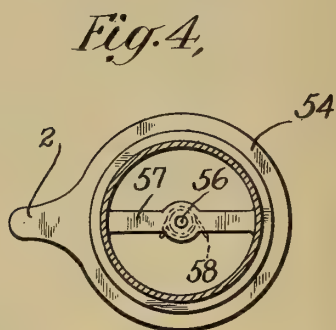
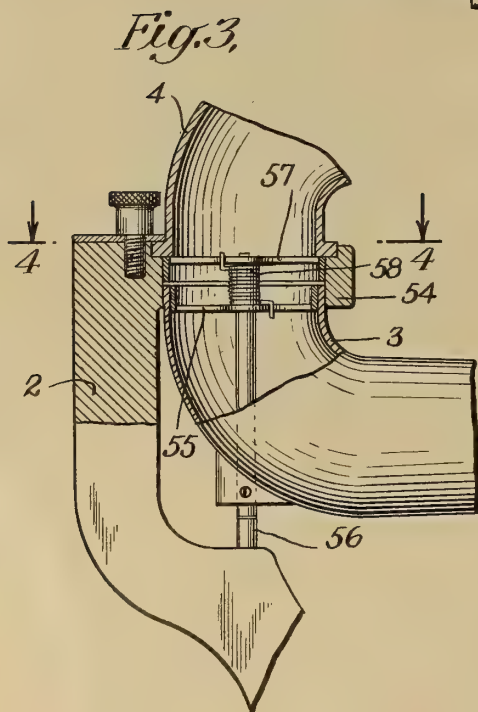
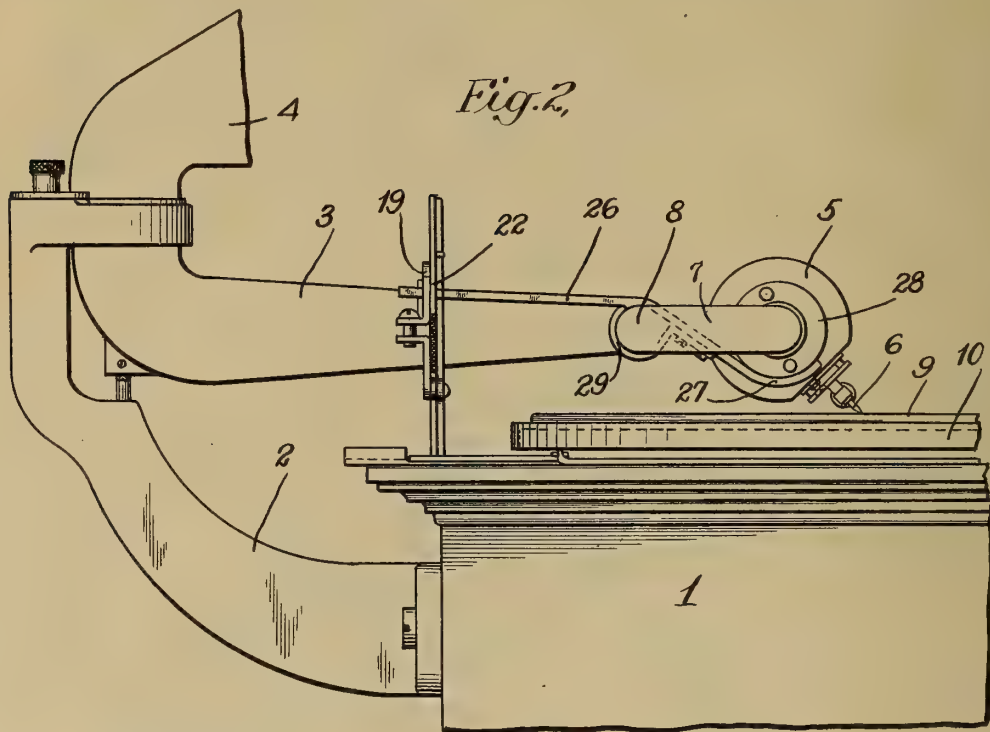


D. M. WINANS.  
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1,165,927.

Patented Dec. 28, 1915.

3 SHEETS—SHEET 2.



INVENTOR  
D. M. Winans  
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ATTORNEY



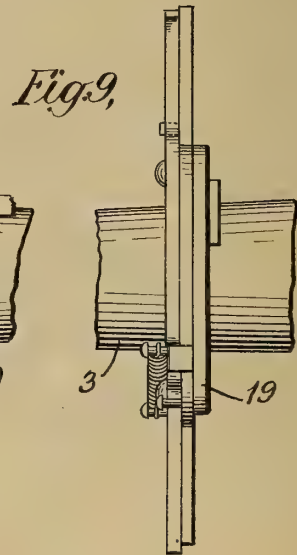
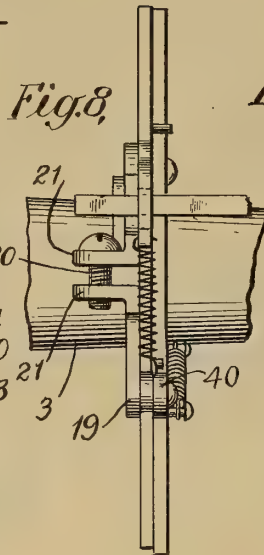
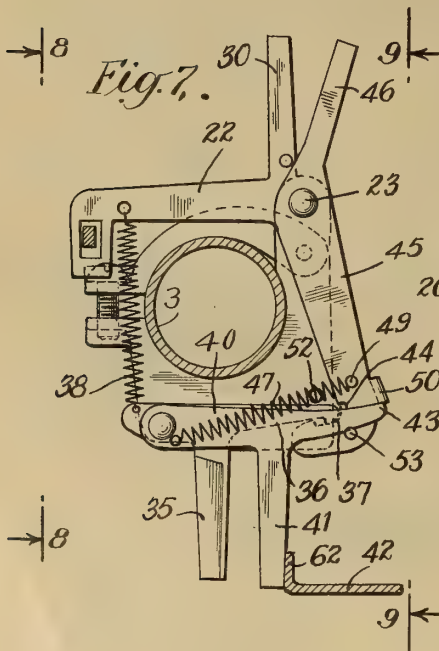
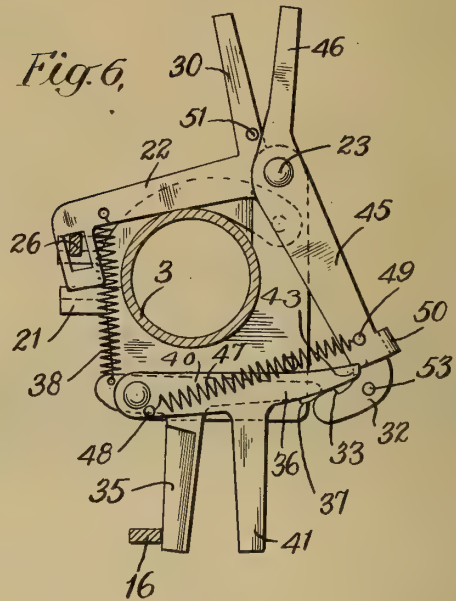
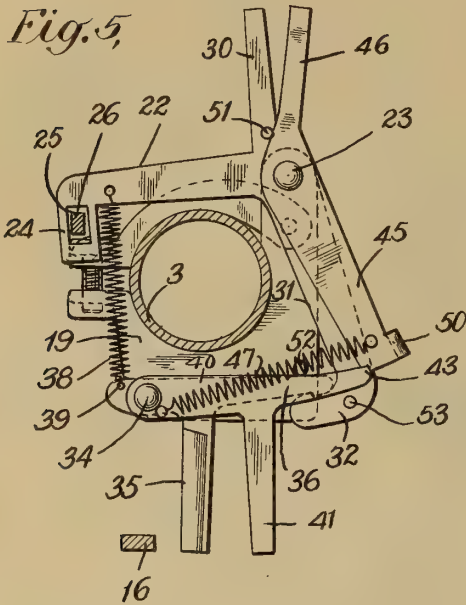


D. M. WINANS.  
TALKING MACHINE WITH REPEAT ATTACHMENT.  
APPLICATION FILED JULY 17, 1915.

1,165,927.

Patented Dec. 28, 1915.

3 SHEETS—SHEET 3.



INVENTOR  
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ATTORNEY

# UNITED STATES PATENT OFFICE.

DANIEL M. WINANS, OF BINGHAMTON, NEW YORK.

TALKING-MACHINE WITH REPEAT ATTACHMENT.

1,165,927.

Specification of Letters Patent.

Patented Dec. 28, 1915.

Application filed July 17, 1915. Serial No. 40,352.

*To all whom it may concern:*

Be it known that I, DANIEL M. WINANS, a citizen of the United States, residing at Binghamton, in the county of Broome and State of New York, have invented certain new and useful Improvements in Talking-Machines with Repeat Attachments, of which the following is a specification.

My invention relates to talking machines having mechanism enabling the same to automatically repeat a record, when desired. That is, if the "repeat" mechanism or attachment is set, in my invention, the record being rotated and the reproducing stylus or needle positioned to reproduce the same, the selection will be played; at the termination of the selection the stylus will be lifted from contact with the record and returned immediately to its starting position, whereupon the stylus is again dropped into engagement with the record and the selection repeated. At the termination of the second rendition of the record the machine is automatically stopped. By my invention, these movements are effected by means of a number of levers carried by the tone arm. When the first rendition of the record is completed, in accordance with the preferred form of my invention, a lever carried with the tone arm contacts lightly with the usual latch of an automatic stop mechanism, this latch or trigger being adapted, when subsequently operated to release the brake and permit the same to be spring-operated to stop the machine in the well-known manner. In my device, however, the trigger referred to is not operated by the first contact therewith of the lever referred to. Instead, the first light contact of the lever with the trigger results in unlatching another lever and causing the reproducing stylus to be lifted from the record surface. The forward movement of the tone arm simultaneously stops, before the brake release trigger has been operated, and the tone arm is immediately returned, by suitable mechanism, to its starting point, the stylus being held out of contact with the record. A second lever carried by the tone arm now encounters an adjustable stop device, as a result of which other lever means are tripped, replacing the stylus in the record groove at the beginning of the record. The stylus now travels a second time over the record and at the end of this second rendition, the first

lever referred to again contacts the trigger of the automatic stop device, this time operating the same and stopping the machine.

The object of my invention is to provide a simple and effective mechanism for operating in the manner described, or for causing a record automatically to be repeated, by the coaction of devices movable with the reproducer, with suitable stop devices on the machine.

Other objects of my invention reside in the details of construction and combinations of parts hereinafter more fully described and claimed in the appended claims.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawings forming part of this application and illustrating one embodiment of my invention.

In the drawings, Figure 1 represents a top plan view of a talking machine having my preferred repeat attachment, Fig. 2 is a side elevation of the same, Fig. 3 is an enlarged vertical section through the upper end of the tone arm, Fig. 4 is a horizontal section on line 4—4 of Fig. 3, Fig. 5 is a section taken on line 5—5 of Fig. 1, the reproducer being about to complete its first rendition of the record, Figs. 6 and 7 are similar views showing the tripping of the levers at the end of the first rendition and at the beginning of the second rendition of the record respectively, and Figs. 8 and 9 are side elevations of the mechanism shown in Fig. 7 viewed in the direction of the arrows 8 and 9 respectively.

For purposes of illustration, I have shown a talking machine having the casing 1, from which extends the bracket 2, supporting the tone arm 3, from which is carried the amplifying horn 4. The reproducer 5, provided with the stylus or needle 6, is supported by the goose-neck 7, pivotally mounted at 8 on the end of the tone arm. The stylus 6 operates upon the disk record 9, carried by the turntable 10, the stylus being fed or progressed inwardly of the record by its engagement with the record groove.

I have illustrated my improved repeat attachment as coöperating with the form of automatic stop device described in my Patent No. 1,084,993, dated January 20, 1914, although any of the well-known automatic stop devices may be used in which a part movable with the tone arm contacts a latch



device or trigger to operate, or permit the operation of the brake. In the construction illustrated in the drawings, the lever 11, pivotally supported underneath the turntable, carries a pad 12, adapted to press against a flange on the turntable to stop the rotation thereof, when lever 11 is actuated by spring 13. Lever 11 is held in inoperative position by a trigger 14, pivoted at 15. A wedge-shaped member 16 is carried by lever 17 and is positioned at one side of the arm 18 of trigger 14 by the adjustment of lever 17 into a desired position, the effect of this adjustment being to interpose a greater or less thickness of member 16 in the path of the trip device carried by the tone arm and thus cause the selection to be stopped at an earlier or a later point.

A supporting plate 19 is secured to the tone arm 3 in any suitable manner, as by fitting the same about the tone arm, and passing a screw 20 through a pair of lugs 21 on the adjacent ends of the plate. A lever 22 is pivoted to plate 19 at 23, the forward end of this lever being extended downwardly, as shown at 24, and provided with a slot 25. A lever 26 is pivotally mounted on the goose-neck 7, adjacent to the pivotal bearing 8 thereof, lever 26 having a forward upwardly curved portion 27 adapted to engage the cylindrical surface 28, at the rear of the sound box or reproducer 5, to lift the reproducing needle from the record. The tail of lever 26 extends through the slot 25 in the downwardly extending portion 24 of lever 22, by which lever 26 is operated to lift the reproducer at the end of the first rendition of a record which is to be repeated.

Lever 26 may be loosely pivoted upon goose-neck 7 in any suitable way, as by providing lever 26 with a strap 29 extending around the goose-neck and secured to lever 26. In the position of the mechanism shown in Fig. 5, in which none of the levers have been tripped, lever 26 is out of contact with the edges of slot 25, the reproducer being supported by the engagement of the stylus with the record, lever 26 thus not interfering with the movements of the reproducer. When the first rendition of the record is completed, however, lever 22 is drawn downwardly into the position shown in Fig. 6, as will be explained, depressing the tail of lever 26 and thereby lifting the reproducer stylus from the record.

Lever 22 is provided with a handle portion 30 extending upwardly above its pivot 23, and a portion 31 extending downwardly below pivot 23, the forwardly extending portion terminating in the downturned end 24, and the downwardly extending arm 31, constituting a bell-crank. Arm 31 of the lever is provided with a forwardly extending foot portion 32 having a latching projection 33 extending a slight distance from

its upper surface. A pair of latching levers are pivoted at 34 to the supporting plate 19. The under or rear lever is provided with a downwardly extending trip arm 35 adapted to contact the adjustable stop member of the automatic stop device, when the stylus reaches or approaches the end of the record. This lever has a portion 36 extending to the right, referring to Figs. 5, 6 and 7, from pivot 34, this arm 36 having a nose 37 adapted to engage with the latching projection 33 of lever 22, as shown in Fig. 5, to hold the upper arm of lever 22 in its raised position out of contact with lever 26. A spiral spring 38 extends between the forward end of the upper arm 22 and the left hand end of lever 36, as shown at 39.

The outer or front one of the two levers referred to as pivoted at 34 has an arm 40 extending to the right from pivot 34 and a downwardly extending trip arm 41. Trip arm 41 is adapted to contact the stop 42, as will be explained, when the stylus has returned inoperatively across the record to the outer edge thereof. Lever 40 has a nose 43 adapted to engage within a notch 44 at the lower end of a lever 45, which is pivoted at 23 in front of lever 22. Lever 45 has a handle portion 46 adjacent to the handle portion 30 of lever 22. A spiral spring 47 is connected at one end to a pin 48 on lever 40, adjacent to the pivot 34 thereof, and at the other end to a pin 49 on lever 45 adjacent the lower end thereof. Spring 47 is stronger than spring 38 already described. Lever 45 has a rearwardly extending projection 50 at its lower end, adapted to contact the right hand edge of arm 31 of lever 22 when the parts are in the position shown in Fig. 6.

The handle 30 of lever 22 is provided with a stop pin 51, adapted to contact the left hand edge of handle 46 of lever 45, as shown in Fig. 5, and thereby prevent undue upward movement of lever 22. A pin 52 on plate 19 limits upward movement of both levers 36 and 40. A pin 53 on the foot portion 32 of lever 22 limits downward movement of lever 40, as shown at Fig. 7.

The tone arm 3, as shown in Figs. 2, 3 and 4, is provided with means for returning the same across the record to the outer edge thereof, when the stylus is lifted from the record groove. The tone arm is pivotally mounted in the forwardly extending annular portion 54 of bracket 2, the tone arm having a spider 55 through which the pivot rod 56 extends, the upper end of this rod being mounted in the cross piece 57 secured within the annular portion 54 of bracket 2, in the usual manner. A spiral spring 58 is mounted about pivot rod 56 between spider 55 of the tone arm and cross piece 57 of the bracket, its ends being secured to these two members in such a manner as to tend to



move the tone arm toward the outer edge of the record and turntable.

The stop 42, which as stated, is adapted to be contacted by trip arm 41 of lever 40 is adjustably secured to the top of casing 1, as shown in Fig. 1. Stop member 42 may suitably comprise a strip of metal having diagonal slots 59, 59 therethrough, through which screws 60, secured in the casing, extend, these screws being tightened in any desired position of member 42. Member 42 may be provided with an upturned end 61 to constitute a handle and an upturned flange 62 on the inner edge of the member adjacent to one end. This flange 62 constitutes the stop which is contacted by trip arm 41. The position of flange 62 is varied to permit the use of records of different sizes, such as ten inch and twelve inch disks, by positioning member 42 so that screws 60 are mounted in one end or the other of diagonal slots 59, or in an intermediate position.

The operation of the device may now briefly be explained.

When it is desired to play the same record twice, handles 30 and 46 are pressed together, with the result that lever 36 is latched by projection 33 of arm 31 and lever 45 is latched by the engagement of nose 43 with notch 44, the parts now being in the position shown in Fig. 5. Previous to this, the reproducer has been positioned over the inner edge of the record with the stylus in contact with the last groove of the record and the adjustable member 16 of the automatic stop device positioned to contact the forward edge of trip arm 35, the same as would be done if it were desired merely to adjust the automatic stop device for the record, without regard to the repeating mechanism. The reproducer is then moved over to the outer edge of the record, with the stylus in line with the outside groove of the record and stop member 42 positioned so that its flange 62 will contact trip lever 41. The machine is then started, and the stylus being positioned in the record groove, will travel across the record, the feed of the reproducer relative to the record being caused by the engagement of the stylus with the record groove. When the rendition of the record is completed, trip arm 35 contacts stop member 16, as shown in Fig. 6. Member 16 is not, however, moved sufficiently by this contact to release brake lever 11, since the first light contact of arm 35 with member 16 raises lever 36 sufficiently to disengage its nose 37 from latching projection 33, whereupon spring 38 immediately swings lever 22 downward, as shown in Fig. 6, whereby the tail of lever 26 is depressed and the reproducer 5 lifted so that the stylus is clear of the record. Thereupon, the tone arm is immediately swung in the reverse

direction, the stylus passing over the record surface without contacting the same, until trip arm 41 contacts the stop flange 62, as shown in Fig. 7. This results in depressing lever 40, so that its nose 43 drops from notch 44 and spring 47 draws lever 45 to the left into the position shown in Fig. 7. Spring 47 is stronger than spring 38, as stated, and lug 50 on lever 45 being in contact with arm 31 of lever 22, this movement of lever 45 carries lever 31 with it, the upper arm of the bell-crank being raised against the force of its weaker spring 38. This removes the pressure of lever 22 from the tail end of lever 26 and allows the stylus to again drop into the outer groove of the record. The record is now played for the second time, at the end of which trip arm 35 again contacts adjustable stop member 16. The various levers now being tripped, however, there is nothing to cause the stylus to be lifted from the record, and the continued contact of arm 35 with member 16 swings member 16 and arm 18 of the trigger 14 therewith, so that trigger 14 moves out of contact with lug 63 on brake lever 11, permitting the brake to be applied and the machine stopped.

It is obvious that when it is not desired to repeat a record, the parts of the repeat mechanism are simply left unlatched, as shown in Fig. 7, whereupon arm 35 contacting stop member 16 will stop the machine at the end of each rendition. If it is desired to repeat a record more than twice, without stopping the machine, the repeat mechanism may be relatched, without interrupting the record, by merely pressing handles 30 and 46 together.

In the broader aspects of my invention, stop member 16 may be considered simply as an abutment without reference to an automatic stop device. Also, while I have illustrated my invention in connection with a well-known form of talking machine, in which the reproducer is carried at the end of the pivoted tone arm and fed across the revolving disk record, it is obvious that my invention is not limited to this type of machine.

The preferred form of my device as illustrated is extremely simple, may be manufactured at small cost and is certain in its operation.

Having described my invention, what I claim as new therein and desire to secure by Letters Patent of the United States is:

1. In a talking machine, having a pivoted tone arm, reproducer, stylus, rotatable record carrier, and brake means therefor, the combination of a trigger for latching the brake in inoperative position, means carried by the tone arm adapted to contact said trigger at the end of a record, means for lifting said stylus from the record when said means contacts said trigger, and without operating



said trigger, means for returning said tone arm across the record with the stylus out of contact therewith, and means for causing the stylus to again engage the record at the beginning thereof, substantially as set forth.

2. In a talking machine, having a rotatable record-carrier and a reproducer and stylus movable relatively thereto to play a record when the stylus is in engagement with the record, the combination of an automatic stop device, including a stop member, means movable with the reproducer adapted to contact said stop member at the end of a record, a member latched in inoperative position by said means, and unlatched by the light engagement thereof with said stop device, devices for lifting the stylus from the record when said member is unlatched, spring means for returning the reproducer to its starting position, when the stylus has been lifted, and means for causing the stylus to again engage the record at the beginning thereof, said first means being adapted to operate said stop member when pressed against the same thereafter, said member being unlatched, substantially as set forth.

3. In a talking machine, having a rotatable record carrier and a reproducer and stylus movable relatively thereto to play a record when the stylus is in engagement with the record, the combination of an automatic stop device, including a stop member, means movable with the reproducer adapted to contact said stop member at the end of a record, without operating said stop device, means for lifting the stylus from the record thereupon, means for returning the reproducer to its starting position, an abutment, and means movable with the reproducer adapted to contact said abutment and thereupon to cause the stylus to again engage the record at the beginning thereof, substantially as set forth.

4. In a talking machine, having a rotatable record carrier and a reproducer and stylus movable relatively thereto to play a record when the stylus is in engagement with the record, the combination of an automatic stop device, including a stop member, means movable with the reproducer adapted to contact said stop member at the end of a record, a member latched in inoperative position by said means, and unlatched by the engagement thereof with said stop device, and devices for lifting the stylus from the record when said member is unlatched, said means being adapted to operate said stop device when pressed against the same with sufficient force, substantially as set forth.

5. In a talking machine, having a rotatable record carrier and a reproducer and stylus movable relatively thereto to play a record when the stylus is in engagement with the record, the combination of a stop, a trip device movable with the reproducer adapted

to contact said stop at the end of the record, a lever latched by said trip device and released by the contact of the latter with said stop, and means operated by said lever to lift the stylus from the record when said lever is released, substantially as set forth.

6. In a talking machine, having a rotatable record carrier and a reproducer and stylus movable relatively thereto to play a record when the stylus is in engagement with the record, the combination of stops positioned to be contacted when the stylus has approximately completed its forward and return movements across the record, trip devices movable with the reproducer adapted respectively to contact said stops at the ends of said forward and return movements, a pair of lever means latched by said trip devices, respectively, and adapted to be released by the contact thereof with said stops, a lever adapted to lift the reproducer when operated, means for causing said first lever means, when released, to operate said lever, and means for causing said second lever means, when released, to return said first lever means to inoperative position, substantially as set forth.

7. In a talking machine, the combination of a pivoted tone arm, a reproducer and stylus carried thereby, adapted to coact with a rotatable record, a spring tending to swing the tone arm outwardly across the record, reproducer-lifting means, carried by the tone arm, means for latching the same in inoperative position, comprising a detent, and a stop positioned to be contacted by said detent to unlatch said latching means, when said stylus reaches the end of the record, substantially as set forth.

8. In a talking machine, the combination of a pivoted tone arm, a reproducer and stylus carried thereby, adapted to coact with a rotatable record, a spring tending to swing the tone arm outwardly across the record, a lever, mounted on the tone arm, adapted to raise the stylus from the record, a lever adapted to depress an end of said first lever to raise the stylus, a spring for operating said second lever, and means for latching said second lever in inoperative position comprising a detent having a trip arm, said levers and latching means being carried by the tone arm, substantially as set forth.

9. In a talking machine, having a rotatable record carrier and a reproducer and stylus movable relatively thereto to play a record when the stylus is in engagement with the record, the combination of stops positioned to be contacted when the stylus reaches the end of its forward and return movements, respectively, across the record, and devices mounted to move with the reproducer, comprising reproducer-lifting means, a bell-crank for operating the same,

a lever and spring for moving said bell-crank to inoperative position, a weaker spring for operating said bell-crank, and means for latching said bell-crank, and said lever, in inoperative positions, adapted to be released by contact with said stops, respectively, substantially as set forth.

This specification signed and witnessed this 14th day of July, 1915.

DANIEL M. WINANS.

Witnesses:

D. W. GREGG,  
M. G. HALEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





PHONOGRAPHY  
INDICATING DEVICE FOR PHONOGRAPHY AND  
ITS APPLICATION,

# 1,166,115-----M. De Pezzer,  
Patented-Dec. 28th, 1915.  
Filed-July 26, 1910.

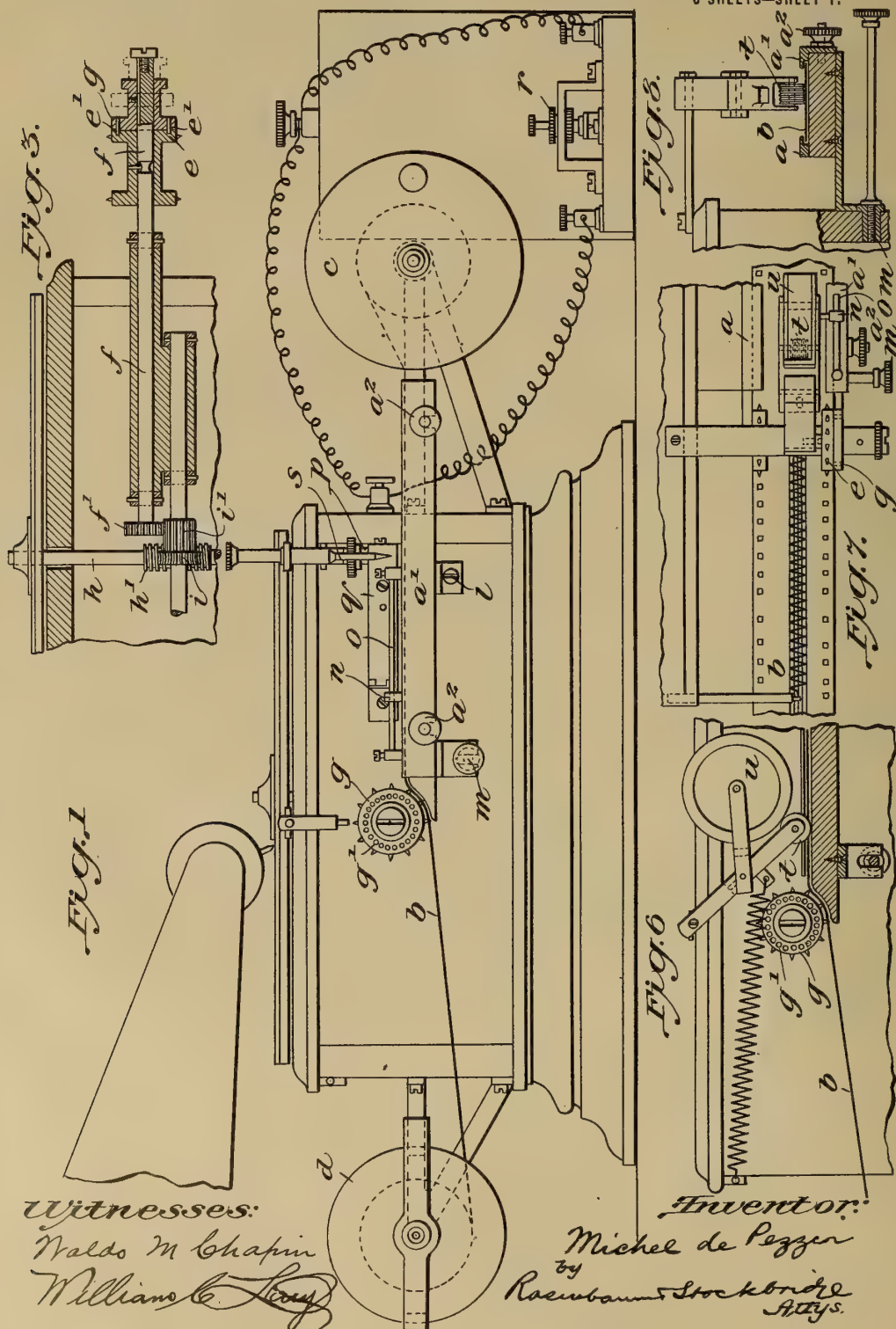
## INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.

APPLICATION FILED JULY 26, 1910.

Patented Dec. 28, 1915.

6 SHEETS—SHEET 1.

1,166,115.



*Witnesses:*

Waldo M Chapin

William C. Loring

*Inventor:*

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by  
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Attys.





M. DE PEZZER.  
 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
 APPLICATION FILED JULY 26, 1910.

1,166,115.

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6 SHEETS—SHEET 2.

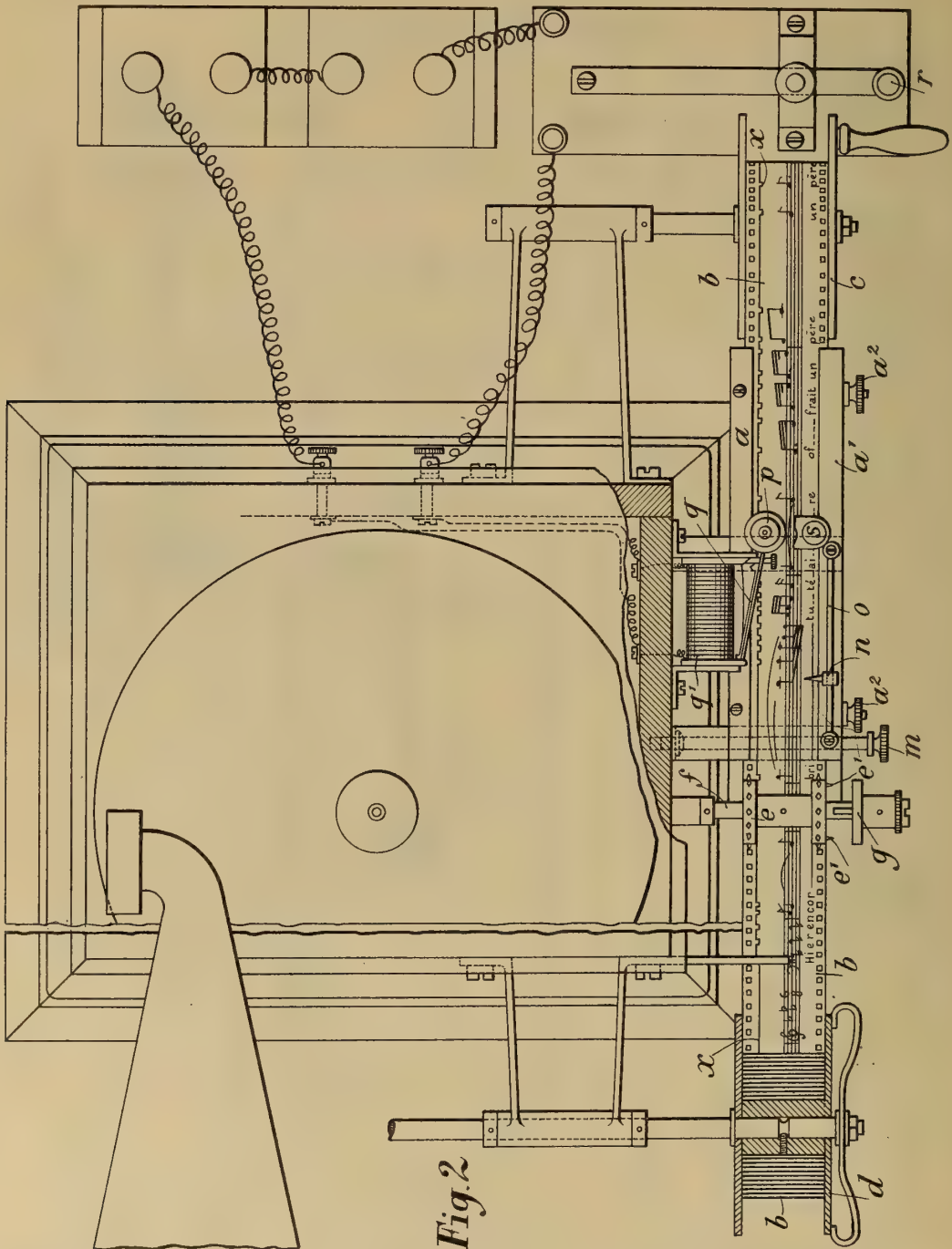


Fig. 2

Witnesses:  
*J. C. Cheney*  
*Waldo M. Chapin*

Inventor  
*Michel de Pezzer*  
 By *Attorneys*  
*Rosenbaum & Stockbridge*



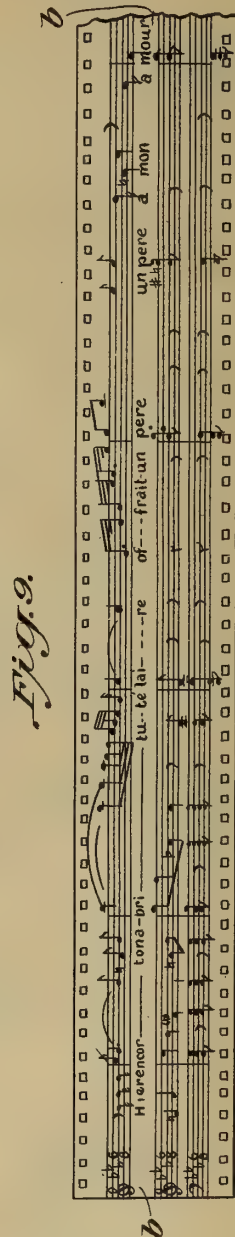
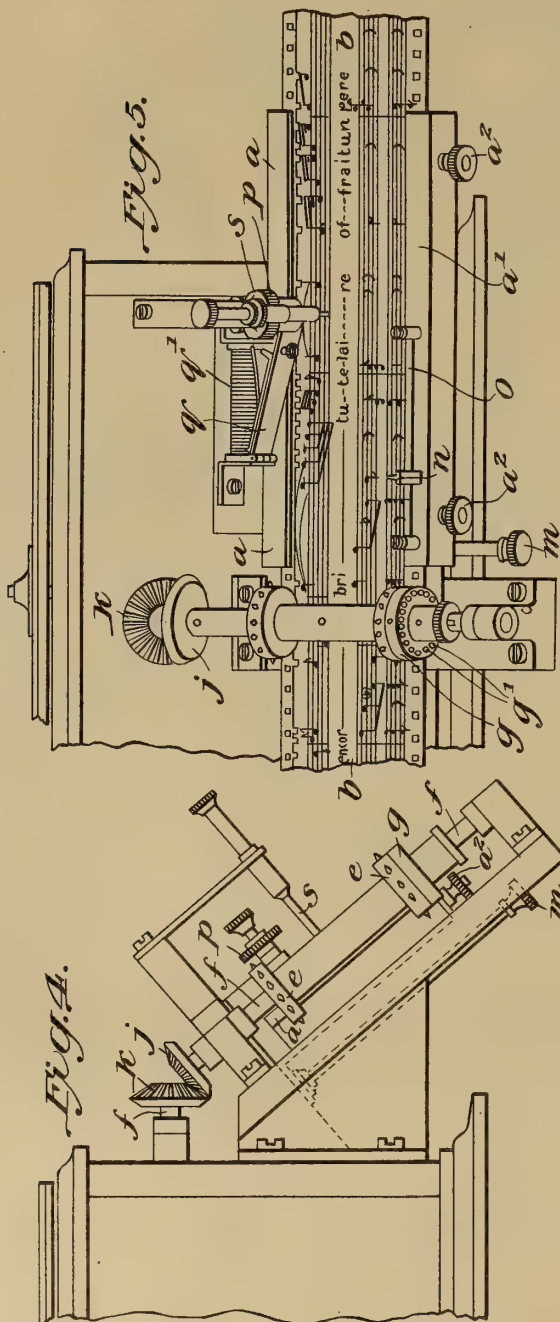


M. DE PEZZER.  
 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
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1,166,115.

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6 SHEETS—SHEET 3.



Witnesses:

Walter M. Chapin  
 William La Lary

Inventor:

Michel de Pezzer  
 by  
 Rosinbaum & Stockbridge  
 Attys.

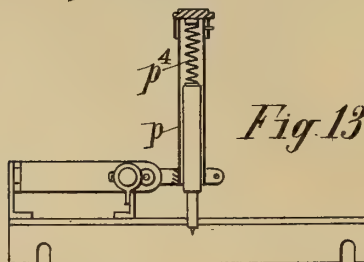
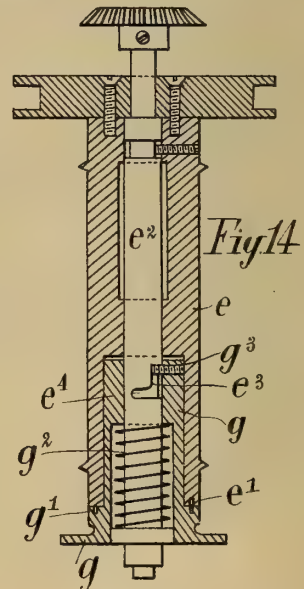
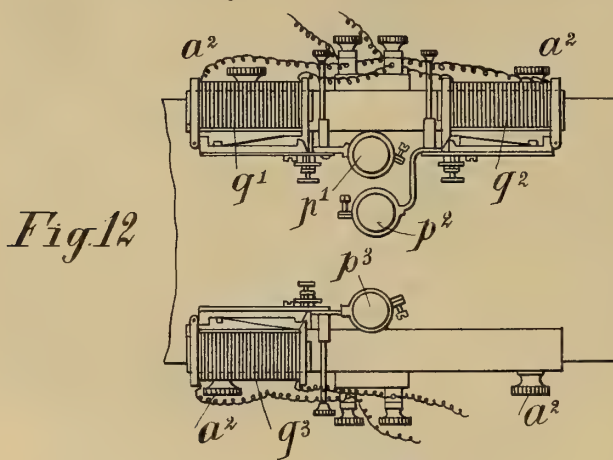
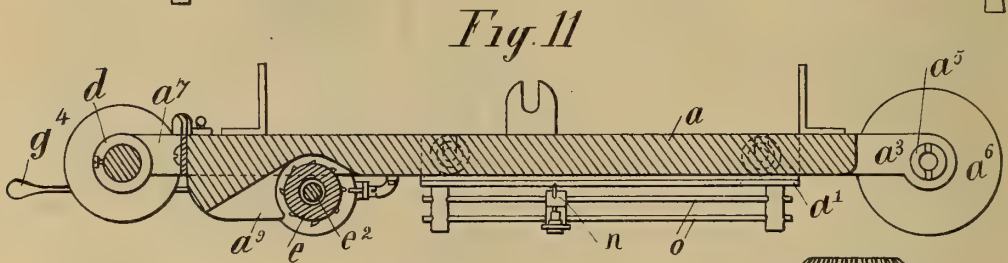
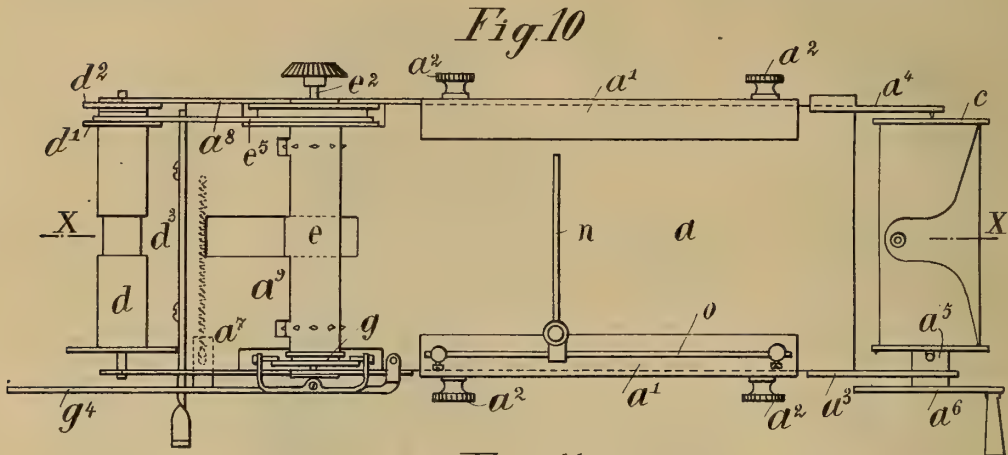


M. DE PEZZER.  
 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
 APPLICATION FILED JULY 26, 1910.

1,166,115.

Patented Dec. 28, 1915.

6 SHEETS—SHEET 4.



Witnesses:  
*Geo. C. Lehen*  
*Waldo M. Chapin*

Inventor  
*Michel de Pezzer*  
 By his Attorneys  
*Rosenbaum & Stoddard*





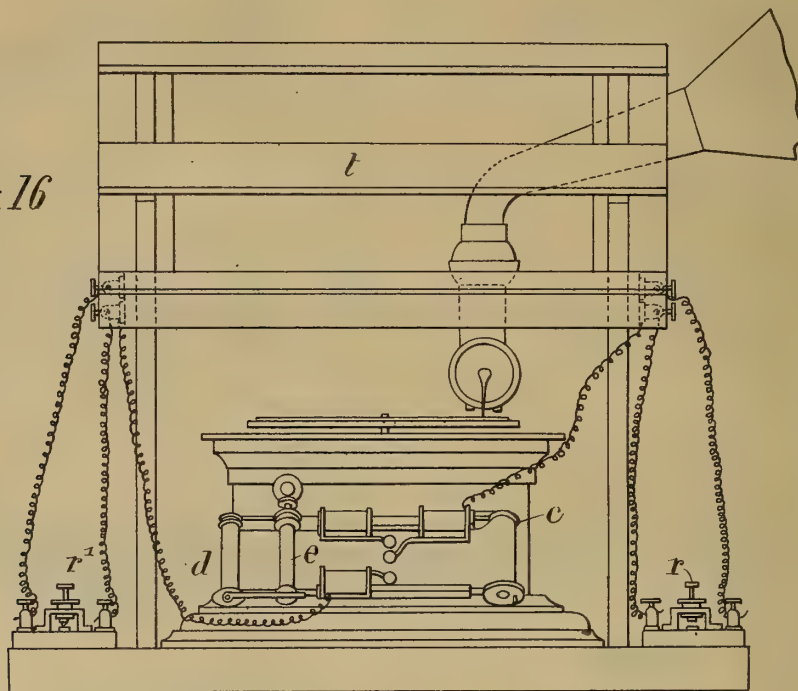
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 APPLICATION FILED JULY 26, 1910.

1,166,115.

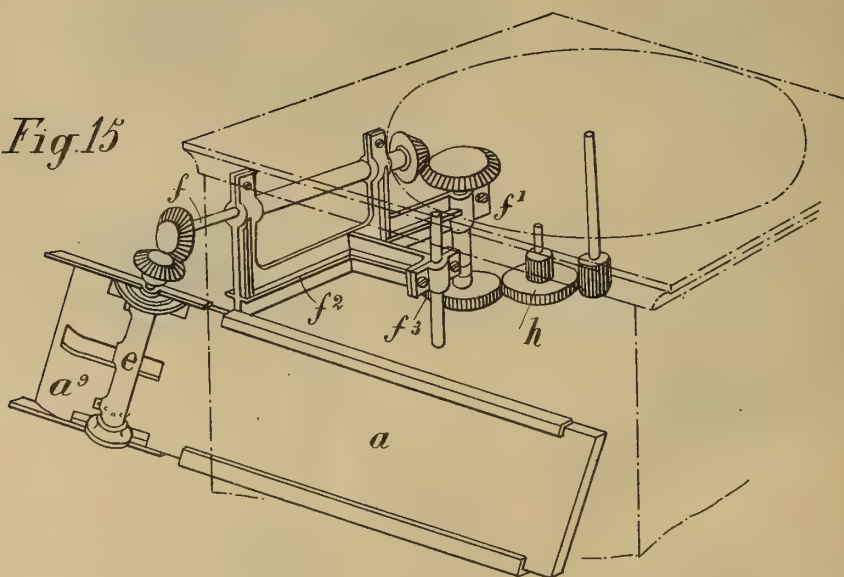
Patented Dec. 28, 1915.

6 SHEETS—SHEET 5.

*Fig. 16*



*Fig. 15*



Witnesses:  
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*Waldo M. Chapin*

Inventor  
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 INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.  
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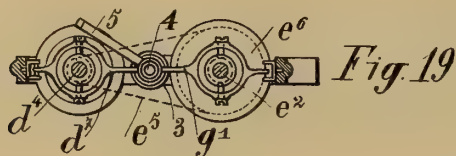


Fig. 19

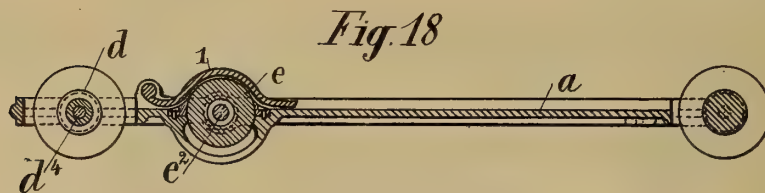


Fig. 18

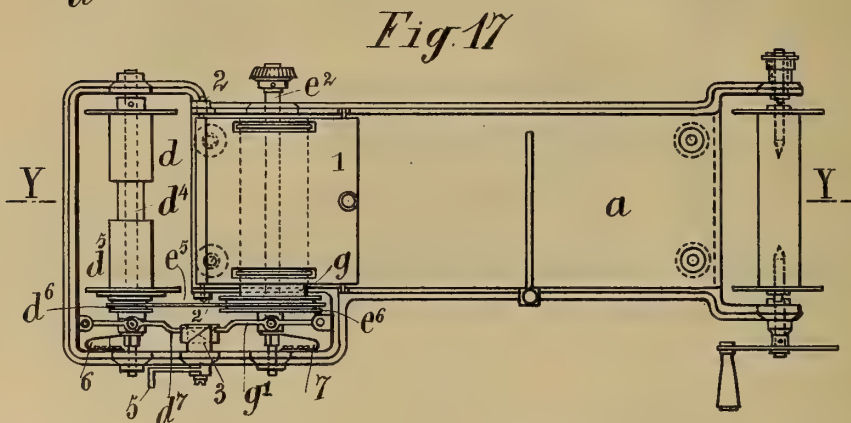


Fig. 17

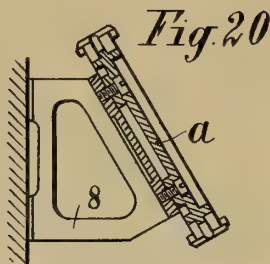


Fig. 20

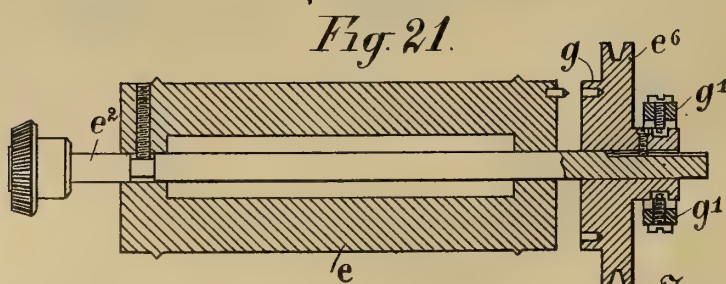


Fig. 21

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# UNITED STATES PATENT OFFICE.

MICHEL DE PEZZER, OF PARIS, FRANCE.

## INDICATING DEVICE FOR PHONOGRAPHY AND ITS APPLICATION.

1,166,115.

Specification of Letters Patent.

Patented Dec. 28, 1915.

Original application filed June 15, 1909. Serial No. 502,274. Divided and this application filed July 26, 1910. Serial No. 573,975.

*To all whom it may concern:*

Be it known that I, MICHEL DE PEZZER, a citizen of the Republic of France, residing at Paris, in the Department of the Seine, France, have invented certain new and useful Improvements in Indicating Devices for Phonography and Their Application, of which the following is a full, clear, and exact description.

10 This invention refers to an indicating arrangement which permits of following by reading the ordinary emissions of a phonograph simultaneously with the production of the said sounds.

15 This invention also refers to the process of preparing the record of a mechanically driven apparatus so that the record thus produced may be operated in synchronism with the record of a second apparatus, which is generally a phonograph, the subject-matter of which is disclosed in my Patent No. 1,101,326, granted June 23, 1914, on application, Serial No. 502,274, filed June 15, 1909, of which application the present application is a division.

25 The essential element of the indicating device consists of a flexible band unwound by clock-work and inscribed with the various parts of the piece to be performed, for example, the song, the words and the accompaniment. On this band the music or the words are not written as is usual with scores, that is to say, that instead of the space existing between the various bars depending on the number of signs to be arranged between the said bars, this inscription solely depends on the period of time occupied in executing the sounds or syllables inclosed between two consecutive bars. In other words, when the band is unwound, the various musical signs, or the various syllables of the words, pass (before a fixed pointer, for example) exactly according to the various alterations of speed imparted to the whole according to the expression it is desired to impart. It can consequently be understood that by following the unwinding of the indicating band, the performers, for example, the singer and the accompanist, are guided in the execution of their respective parts, so as to be always together and any hesitancy or inaccuracy in the execution is thereby avoided. Whatever the case may be, the indicating band will generally comprise one or more lines referring to the melodious part or to the declamatory part, and one or more other lines referring to the accompaniment.

In order practically to carry out the special rhythmic and expressive inscription referred to above, and at the same time to obtain agreement between the various parts, for the production of the band, it will be necessary to provide a method for inscribing the rhythm upon the band and this method comprises essentially driving the band past a fixed point at a speed which is proportional to the speed of the sound producing machine and inscribing upon the band as it passes the fixed point a visible mark which registers the beginning and end of each sound or tone which is to be indicated.

The indicator, formed in the manner just described, is capable of various applications, either alone or in combination with other musical apparatus, more particularly the phonograph. In this latter case, by separately recording the song and the accompaniment, it permits the singer being accompanied by the phonograph, or, an accompanist to accompany a song by the phonograph.

I shall now describe my invention with reference to the accompanying drawings, showing the musical indicator referred to above as applied to a gramophone, and provided with one arrangement for the production of the rhythmic bands of the indicator in accordance with my method.

Figure 1 is an elevation of the whole arrangement. Fig. 2 is a corresponding plan view. Fig. 3 is a detail showing the actuating mechanism of the rhythmic band. Figs. 4 and 5 respectively show a side and front view of a modification. Figs. 6 to 8 show a front, plan and side view of the application of an arrangement for inscribing staves. Fig. 9 shows a portion of a rhythmic band. Fig. 10 shows a modification of the arrangement of the desk. Fig. 11 is a longitudinal section on the line X—X of Fig. 10. Fig. 12 shows a portion of this desk with inscribing styles. Fig. 13 is a detailed view showing one of these styles. Fig. 14 is a detailed view, on a larger scale, showing a longitudinal section of the actuating roller of the desk shown in Fig. 10. Fig. 15 is a perspective view of the mechanism actuating this roller. Fig. 16 is an elevation showing this desk fitted to a phonograph and provided with its electrical actuating mechanism. Figs. 17 to 21 show another modification of the desk, in which Fig. 17 is a plan view. Fig. 18 a longitudinal section on Y—Y of Fig. 17. Fig. 19 an elevation



showing the mechanism for actuating the engaging and disengaging gear. Fig. 20 showing a cross section of the desk as fitted to the phonograph, and Fig. 21 is a detail showing on a larger scale a longitudinal section of the actuating roller.

The arrangement shown in Figs. 1 to 3 comprises a guide (*a*) in which is passed the rhythmic indicating band (*b*); one of the sides (*a'*) of this guide is movable so as to permit of rapidly inserting and removing the band (*b*); this movable side (*a'*) is held in position on the guide (*a*) by milled screws (*a''*) (Figs. 1, 2 and 8). The band (*b*) is unrolled from a stock reel (*c*) on to a receiving reel (*d*). This unrolling movement of the band (*b*) is controlled by a double pin-wheel (*e*) fitted loose to a shaft (*f*) which is rotated and at the desired moment rotates the pin-wheel (*e*) by the intermediation of a coupling disk (*g*). This disk (*g*) can slide along the shaft (*f*) but is always carried around on the rotation of the latter. The inner surface of the disk (*g*) is provided with slots or recesses (*g'*), which are for the purpose of meshing with projections (*e'*) provided on the adjacent surface of the pin-wheel (*e*) (Figs. 2 and 3).

The shaft (*f*) is rotated by clock-work or in any other suitable manner. For the case in which the indicating band is fitted to a phonographic apparatus, as in the example shown in the drawings, the shaft (*f*) would be rotated by the driving shaft (*h*) of the phonograph, by the intermediation of any suitable transmission whatever; for example, the shaft (*h*) may be provided with a worm (*h'*) meshing with a worm-wheel (*i*), fixed to a pinion (*i'*) which latter meshes with a cog-wheel (*f'*) keyed to the shaft (*f*).

In order to facilitate the reading of the band, more especially when the latter is inscribed with the song and the accompaniment, the guide (*a*) may be inclined at a variable angle, as shown in Figs. 4 and 5; in this case the shaft would consist of two parts, connected together by beveled pinions (*j*, *k*).

In order to be able to easily disengage the indicating band (*b*) from the pin-wheel (*e*), the guide (*a*) can be turned slightly around the fixing screw (*l*), and is held in position at its other extremity by a set screw (*m*). The receiving reel (*d*) has imparted to it a rotary movement which can be controlled either by the pin-wheel (*e*) or by the clock-work of the apparatus. The side (*a'*) of the guide (*a*) is provided with a pointer (*n*) movable along a rod (*o*) so as to be brought in front of the desired spot of the indicating band.

In order to produce this band, it is first necessary to inscribe the rhythm of the piece; with this object in view, the band ac-

tuated as has been described, is unwound, and by means of a style on the emission of each note or each syllable, a line is traced on this band and is prolonged during the whole period through which this note or syllable is sustained. This succession of lines, some long others short, constitutes a graphic indication of the rhythm of the piece. In front of the starting point of each line, the corresponding notes or syllables are inscribed on the band, and beneath the same the corresponding notes of the accompaniment. For inscribing this graphic record the present arrangement may consist of a style (*p*), fitted to the armature (*q*) of an electro-magnet (*q'*) in the circuit of which a manipulator (*r*) is arranged. When the current is cut off from the electro-magnet (*q'*), the style (*p*) which should preferably be disposed normal to the surface of the armature which faces the magnet, will be in its position of rest, the armature having been drawn by gravity or other means away from the magnet, and said style will then inscribe on the band a straight line X—X. On each emission of notes or syllables the lever of the manipulator (*r*) will be pressed down, thereby closing the circuit of the electro-magnet (*q'*), the armature (*q*) of which will be attracted and the style (*p*) will first trace a small line approximately perpendicular to the line X—X; during the whole period during which the note or syllable is sustained the manipulator (*r*) is kept pressed down, and the style (*p*) will then trace on the band a line parallel to the line X—X, and the length of which will depend on the period of time that this note or syllable is sustained.

The tracing point of the style (*p*) may be mounted on an arrangement which permits of removing the band of paper whenever no line should be inscribed on the band. Another auxiliary style (*s*) mounted on a spring and intended to be operated directly by hand, may be arranged in front of the style (*p*). This second style (*s*) may be utilized as a substitute for the style (*p*), or for marking on the band certain reference lines intended for example, in the case in which an error has been committed in recording the graphic record by means of the first style actuated electrically, to permit of immediately finding on the band the place where the error has been made. The rhythmic graphic record thus inscribed on the band may be preserved after the inscription of the music and words, or it may be rubbed out. The present apparatus will be provided or not with the arrangement for inscribing the rhythm, according to the purpose to which the apparatus is to be applied. For those persons who desire to make indicating bands, the apparatus should comprise this inscribing device just described, whereas for



those persons who buy the bands and who only utilize the apparatus for regulating the agreement of the various parts of the piece, the apparatus need not be provided with this inscribing device. The apparatus for producing the band may furthermore consist of one or more printing disks (*t*), inked by roller (*u*) (Figs. 6 to 8) and intended for the purpose of tracing the musical staff or staves on the band (*b*), while the latter is being rotated, and this is effected simultaneously with the inscription of the rhythmic graphic record.

By means of the present arrangement of control as applied to a phonograph, and as described above, it is possible to execute one of the parts of a piece by the phonograph and the other portion can be executed by the person with absolute agreement of the two parts. For example, the band (*b*) formed as shown in Fig. 9, and passing along in front of the pointer (*n*) permits an accompanist (pianist or the like) to follow the song performed by the phonograph, inasmuch as the accompanist is always forewarned by the inscriptions of the band (*b*) in front of the pointer (*n*) of the exact moment in which the notes or syllables forming the song will be emitted by the phonograph. The present indicating arrangement also permits of a singer being accompanied by a phonograph.

In the modification shown in Figs. 10 and 11, the apparatus assumes the form of a desk, and consists of a board (*a*) mounted at an angle on a support fitted to one of the sides of the box of the phonograph. Two guides (*a'*) are fitted to the longitudinal edges of this board by means of set screws (*a''*) and serve to guide the band (*b*) on which is inscribed, or on which has to be inscribed, the rhythmic graphic record and the signs or indications corresponding to the sounds emitted by the phonograph. The part (*a*) is provided at one of its extremities with two lugs (*a<sup>3</sup>*, *a<sup>4</sup>*) between which is engaged the stock wheel (*c*); the spindle (*a<sup>5</sup>*) of a crank disk (*a<sup>6</sup>*) turns freely in one of these lugs (*a<sup>3</sup>*); a slot is provided in this spindle and engages with a pin or projection provided on one of the sides of the reel (*c*). The other side of the latter is provided in its center with a small recess in which can engage a point arranged on the end of the lug (*a<sup>4</sup>*) this latter is elastic so as to permit of an easy and rapid insertion and removal of the reel (*c*). At its other end the part (*a*) is provided with two other lugs (*a<sup>7</sup>*, *a<sup>8</sup>*), between which are mounted the pin-wheel (*e*) and the receiving wheel (*d*); in order to increase the contact surface of the band with the pin-wheel (*e*) a boss (*a<sup>9</sup>*) is formed at the back end of the part (*a*). The pin-wheel (*e*) is mounted loose on a shaft (*e<sup>2</sup>*) (Fig. 14) mechanically connected

to the clock-work of the phonograph as described farther on, and is connected up to this shaft by coupling disk (*g*), which is constantly carried around on the rotation of the shaft (*e<sup>2</sup>*) and can be moved longitudinally along the latter. On the interior surface of the coupling disk (*g*), slots or holes (*g'*) are provided and are for the purpose of meshing with one or more pins (*e'*) provided on the pin-wheel (*e*); an interior spring (*g<sup>2</sup>*) tends to maintain the coupling (*g*) constantly engaged with the pin-wheel (*e*). Now, in order that the coupling can be maintained in the disengaged position, the shaft (*e<sup>2</sup>*) is provided with a bayonet groove (*e<sup>3</sup>*, *e<sup>4</sup>*) in which can be displaced a pin (*g<sup>3</sup>*) provided on the coupling (*g*). The coupling (*g*) can be disengaged by hand or by the intermediation of a manipulating lever (*g<sup>4</sup>*). The reel (*d*) is rotated by the pin-wheel (*e*) by the intermediation of a transmission cord or belt (*e<sup>5</sup>*), which latter is preferably elastic. Now, in order to establish or interrupt the mechanical connection between the pin-wheel (*e*) and the receiving wheel (*d*), this latter may be provided at its extremity with two pulleys, the one (*d'*) of which fixed to the reel and the other (*d<sup>2</sup>*) turning loose; the displacement of the transmission cord or belt from the fixed to the loose pulley, or vice versa, can be effected by means of a disengaging bar (*d<sup>3</sup>*) fitted to the part (*a*). The shaft (*e<sup>2</sup>*) is rotated by the cog-wheel (*h*) of the mechanism of the phonograph by the intermediation of two shafts (*f'*) and (*f*) (Fig. 15); these two shafts are carried in a framework (*f<sup>2</sup>*) provided with a collar (*f<sup>3</sup>*) fitted to one of the columns or pillars of the clock-work of the phonograph.

The present arrangement can consequently be applied to all existing phonographs. When the apparatus is utilized for causing a band to be unwound synchronously with the emissions of the phonograph, one of the slides of the guides is provided with a rod (*o*) along which an indicator or pointer (*n*) can be moved; at the moment the first sound is emitted by the phonograph, this pointer (*n*) will be brought in front of the first inscription of the band.

For the case in which the apparatus is employed for inscribing the indicating band, the guides (*a'*) are provided with one, two, or more electric styles (Fig. 12); for example, on the upper guide are mounted two styles (*p'*) (*p<sup>2</sup>*), and on the lower guide a style (*p<sup>3</sup>*). Each of these styles is formed by a pencil holder (*p*), the lead of which is constantly held in contact with the band by the action of the spring (*p<sup>4</sup>*) (Fig. 13.) These pencil holders are respectively fitted to the armature of the electro-magnets (*q'*, *q<sup>2</sup>*, *q<sup>3</sup>*); the two electro-magnets (*q'*, *q<sup>2</sup>*) of the two upper styles are arranged in the same



circuit and are actuated by the same manipulator ( $r$ ), these two styles will trace two identical graphic records on the band; the use of these two styles is a precautionary measure for the case in which one of them for any reason whatsoever might fail to act. These two upper styles are for the purpose of tracing the rhythmic graphic record. The lower style is arranged in a separate circuit and is controlled by a second manipulator ( $r'$ ). This lower style is for the purpose of marking on the band certain indicating signs, reference marks and the like.

The two manipulators may be arranged as shown in Fig. 16 on the right and on the left of the phonograph so that the operator can operate the manipulator ( $r$ ) with the right hand and ( $r'$ ) with the left hand, while at the same time following the band as it is unwound on the board ( $a$ ). If at a certain moment it is necessary to stop the movement of the band, the operator will only have to act on the lever ( $g^4$ ) in order to disconnect the coupling.

If it is desired to maintain the coupling disk disconnected while the phonograph continues working, the coupling ( $g$ ) will be drawn back and turned slightly from right to left by hand, whereby its pin ( $g^3$ ) will be drawn back and engage in the part ( $e^4$ ) of the groove of the shaft ( $e^2$ ). When it is desired to start the band again, the coupling will be turned in the inverse direction, so as to bring the pin ( $g^3$ ) into the part ( $e^3$ ) of the groove; the coupling ( $g$ ) under the action of the spring ( $g^2$ ) will then reengage with the pin-wheel ( $e$ ). The whole of the arrangement can be completed by a desk ( $t$ ) for the purpose of receiving, for example, the score containing the piece sung by the phonograph when it is desired to control the piece inscribed on the score and the inscription of the rhythmic band.

In the modification shown in Figs. 17 to 21, the pin-wheel ( $e$ ) is covered over by cap or case I which can turn around its pivots 2; this cap is for the purpose of maintaining the rhythmic band ( $b$ ) in contact with the upper part of the pin-wheel ( $e$ ); this arrangement permits at the commencement of an operation of more easily placing the band ( $b$ ) in position, inasmuch as it suffices to raise the cap I, to place the free end of the band of the upper part of the wheel ( $e$ ) and to push down the cap I again. This modification, furthermore, comprises a special device for actuating the engaging and disengaging gear of the pin-wheel ( $e$ ); and of the receiving reel ( $d$ ). This arrangement is combined so as simultaneously to control the engaging or the disengaging of the said pin-wheel and the reel so as to avoid the impossibility of any wrong manipulation.

The pin-wheel ( $e$ ) and the receiving reel ( $d$ ) are both mounted loose on their respec-

tive spindles ( $e^2, d^4$ ), and are rotated by two couplings ( $g, d^5$ ). These latter are respectively fixed to two pulleys ( $e^6, d^6$ ), connected together by transmission belt or cable ( $e^5$ ). The coupling ( $g$ ) is firmly attached to the shaft ( $e^2$ ) as regards the rotary movement, but can be freely displaced longitudinally along this shaft. The coupling ( $d^5$ ) is altogether loose on its shaft or spindle ( $d^4$ ). The two couplings ( $g, d^5$ ), are provided with holes or recesses on their inner surface which are intended for engaging with one or more pins or projections provided on the pin-wheel ( $e$ ) and the reel ( $d$ ) as shown in Fig. 21. The displacements of the two couplings ( $g, d^5$ ) are controlled by levers ( $g', d'$ ), and these latter are actuated simultaneously by a single cam 3 keyed to a spindle 4 provided with a manipulating lever 5. According as the latter is moved in one or other direction so will the couplings ( $g, d^5$ ) be moved forward or drawn back on their respective spindles and will thus occasion the connecting up or disconnection of the pin-wheel ( $e$ ) and the reel ( $d$ ). Springs 6, 7 constantly tend to maintain the couplings ( $g, d^5$ ) in connection with the pin wheel ( $e$ ) and the receiving reel ( $d$ ).—Fig. 20 shows the method of mounting the desk ( $a$ ) on a support 8 of special shape fitted to the wall of the box of the phonograph.

The present system of rhythmic inscription is capable of numerous applications.

The present apparatus can be advantageously employed for recording phonographic disks.

At present when an artist sings or speaks in front of a phonograph for the purpose of recording a piece, he is constantly preoccupied with the necessity of terminating his piece within the required time, and if the recording of the piece has not been finished at the moment in which the recording style has reached the end of its course on the disk or cylinder the latter will be of no use, and the artist will have to recommence his piece; but, inasmuch as, in order to obtain a sharp inscription on the disk, it is necessary to sing or speak out very loud, the result will be very tiring for the artist. The present system of rhythmic indicator does away with this inconvenience. Before performing a piece out aloud the artist first sings it softly while the phonograph or the registering apparatus turns without disk or cylinder, while at the same time rotating a band on which the operator traces the rhythmic graphic record of the song to be recorded by scanning on the manipulator the syllables of his song. If the piece is performed within the required time, the syllables may then be inscribed on the band in front of the corresponding lines of the graphic record; if, on the contrary, the piece has not been terminated within the required time, the artist



will have to begin again, but this fresh performance of the piece will not tire the artist because, as has been stated, he is only singing softly without effort and consequently without fatigue. When the rhythmic graphic record of the piece performed has been obtained within the required time, the wax disk is placed on the phonograph, and the band inscribed with the graphic record is introduced into the apparatus. The phonograph is then started, and the artist performs the piece with the strength of voice deemed necessary; as the band is unwound at the same speed as during its inscription, the artist has no longer to worry himself about the time allotted to him, only having to sing according to the inscriptions of the band passing in front of his eyes.

The present apparatus may also be used for any kind of instruction, because the agreement which it supplies between the signs read and the sounds heard produces in the brain an intimate correlation between these signs and these sounds and by frequent repetition this correlation can be fixed in the mind. For example, when teaching singing, or solfeggio the professor may record on a disk and inscribe, as has been stated above, on an indicating band various principles of song or solfeggio and intercalate various performed examples. The pupil can then by obtaining this disk and this band and arranging them on a phonograph provided with the present arrangement, repeat them as often as desired, following the lesson with his eyes at the same time that he hears it.

The present apparatus can also be used for the instruction of languages; thus, the phonograph might pronounce a series of foreign words, and the band would present to the eyes of the auditor either their translation or their spelling; the agreement of the inscriptions of the band and of the words pronounced by the phonograph would also be obtained by means of a graphic inscription, as described above. By this method of teaching, the auditor would be rapidly familiarized with the signification of the words or with their pronunciation.

In the case in which the indicating band has to be read by several persons at one and the same time, the apparatus will be of larger dimensions and the band will be exposed at a suitable height above the ground. With the present indicating apparatus mechanical pianos or organs may be employed for accompanying a piece performed by an artist or by a phonograph.

As previously described, a rhythmic graphic record of the piece would be first inscribed; then according to this graphic record will be determined the position of the perforations of the cards or rolls of these mechanical pianos or organs so as to

establish the agreement between the accompaniment and the song; it will then suffice mechanically to connect the actuating mechanism of the rolls of the mechanical piano or organ with that of the phonograph, or the actuating device of a rhythmic band in accordance with that which has served to manufacture these rolls, in order to obtain synchronism between the accompaniment executed by the mechanical piano or organ and the piece sung by the phonograph or artist. In the case in which the piece is performed by an artist, it suffices for the latter to sing, speak or play while following the passage of the rhythmic band.

The present indicating apparatus may also be applied for synchronizing the movement of a cinematograph or moving picture apparatus with those of a phonograph or sound producing apparatus in the following manner. While the artist is singing, if desired, even relatively softly, a cinematographic apparatus may be used to successively photograph his postures, the play of his physiognomy, the movements of his lips, etc., and during such procedure a rhythmic graphic of the song will be inscribed on the band, thus affording an auxiliary record which closely corresponds throughout with the rhythm of the song, and which is in synchronism with the corresponding portrayals upon the cinematographic record or film. This band is then unwound in the apparatus at the same speed, and the artist sings out loud before the phonograph while following the inscriptions of the band passing along in front of him.

The present invention may also be applied for guiding in a precise manner the performers of the various parts of a piece. An indicating apparatus will be arranged in front of each performer, and all the indicating apparatus will be driven synchronously.

It is clear that the present indicating apparatus for recording the rhythm is capable of numerous other applications, and that the shape, dimensions and arrangement of detail may vary according to the applications.

It is to be understood that in the appended claims the term "record" is to be used in its broad sense and may hence be applied to a phonographic record or to a cinematographic record or film, or to the record of any like piece of apparatus.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. The method of preparing the record of a mechanically driven sound producing instrument, so that the record may be operated in synchronism with the band of a rhythmic indicator, which comprises effecting a relative movement between the band and a fixed point at a speed directly propor-



tional to the speed at which the sound producing instrument drives its record carrying part past the fixed part of the sound producing instrument which controls the emission of sounds therefrom, in inscribing upon said band as it passes said fixed point each time a sound or tone is heard which is to be thereafter emitted from the instrument, a visible mark which registers the beginning and end of each such sound or tone, and thereafter effecting a second similar movement of said band while simultaneously recording the tones and sounds upon the record of the sound producing instrument in proper consonance with the relative movement of said marks indicating such sounds or tones with respect to the fixed point.

2. The method of preparing the record of a sound producing instrument so that the record may be operated in synchronism with the band of a rhythmic indicator, which comprises driving said band past a fixed point at a speed directly proportional to the speed with which the record carrying part of the instrument is driven past the fixed part of the instrument which controls the sounds emanating therefrom, in inscribing upon said band as it passes said fixed point a visible mark registering the beginning and end of each sound or tone which is to be thereafter emitted by the sound producing instrument, whereby a graphic record of the sounds or tones to be produced is recorded, and in then effecting a second similar movement of said band and in reproducing upon the record of the sound producing instrument each time a graph indicating a sound or tone passes the fixed point of the indicator the sound or tone which corresponds thereto.

3. In the process of preparing the record of a mechanically driven apparatus, so that said record may be operated in synchronism with the record of a second apparatus, one at least of said apparatus being a phonograph, the steps which consist in effecting relative movement between a given point and a receiving surface at a speed proportionate to that of one of said apparatus, making particular indications upon said surface simultaneously with the production of preliminary or trial sounds or tones, each of which corresponds substantially to a sound or tone to be later recorded upon a phonograph record, and also making particular indications upon said surface in consonance with the respective terminations of said trial sounds or tones, whereby to produce a succession of indicating marks on the receiving surface corresponding to the sequence and duration of the said trial sounds or tones,

then repeating said sounds or tones to the phonograph in the same sequence and duration respectively as the marks were recorded on said surface.

4. In the process of preparing phonographic records adapted to be operated in synchronism with a cinematographic film, the steps which consist in simultaneously photographing the moving subject and making a rhythmic graphic record of the sounds or tones produced by the subject while being photographed, and then making a phonographic record of said sounds or tones by delivering the same to a phonograph at a speed proportionate to the movement of the camera as determined by the said rhythmic record.

5. The method of preparing a movable band for a rhythm indicator adapted to be driven past a fixed point in synchronism with a mechanically driven sound producing instrument, the steps which consist in effecting the movement of the band past a fixed point at a speed directly proportional to the speed with which the sound producing instrument is adapted to drive its movable record past the relatively fixed part of the instrument which controls the emission of sound therefrom, and in inscribing upon said band as it passes said fixed point each time a sound or tone is heard which is to be indicated, a visible mark registering the beginning and end of each such sound or tone.

6. The method of preparing a movable band for a rhythm indicator adapted to be driven past a fixed point in synchronism with a mechanically driven sound producing instrument, the steps which consist in effecting the movement of the band past a fixed point at a speed directly proportional to the speed with which the sound producing instrument is adapted to drive its movable record past the relatively fixed part of the instrument which controls the emission of sound therefrom, in inscribing upon said band as it passes said fixed point each time a sound or tone is heard which is to be indicated, a visible mark registering the beginning and end of each such sound or tone, and in inscribing upon said band a musical notation, or verbal expression, or both, of such sounds or tones which were indicated, spacing them in accordance with said marks and in the same sequence.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

MICHEL DE PEZZER.

Witnesses:

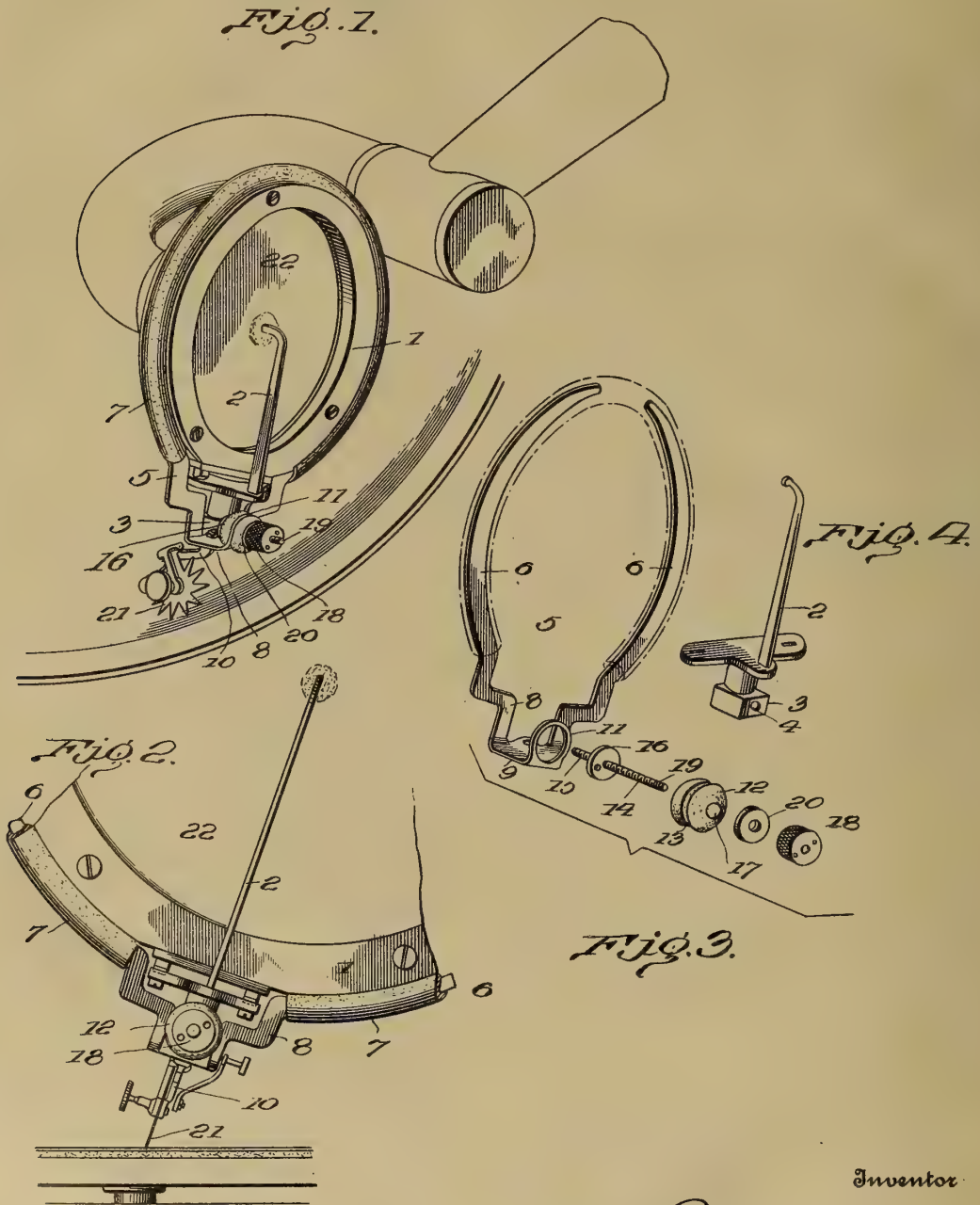
HENRY DANBY,  
LUCIEN CRESPIN.

SOUND BOX FOR TALKING MACHINES,  
# 1,166,254-----M.A. Possons,  
Patented-December 28, 1915.  
Filed-November 27, 1914.

M. A. POSSONS.  
SOUND BOX FOR TALKING MACHINES.  
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Patented Dec. 28, 1915.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## SOUND-BOX FOR TALKING-MACHINES.

1,166,254.

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*To all whom it may concern:*

Be it known that I, MINARD A. POSSONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in sound boxes for talking machines and pertains particularly to an addition to or attachment for sound boxes of the general type now in common use.

It is well known to all users of talking machines of today that the needle in dragging over the record, makes a very perceptible scraping sound, and that this varies in intensity or degree according to the condition or quality of the record. It is also well known to users of talking machines that in addition to this scraping noise, there is a metallic sound which also varies according to the record and the machine, and the naturalness of the voice is lacking to the extent or degree of the metallic sound.

One object of my present invention is to provide a needle supporting means for the sound box which may either be supplemental to the sound box, or as an attachment thereto, whereby the scraping and metallic sound in the needle is very greatly, if not wholly reduced, and whereby all of the sound waves of the record are more perfectly reproduced.

Another object of the present invention is to so construct the supplemental sound box supporting means, that it can be readily attached to the sound boxes now commonly used.

Another object of my invention is to provide means for making the reproduction loud or soft, or for modifying the reproduction to any degree between maximum loud, and minimum soft, at the will of the operator.

A further object of my present invention is to accomplish the foregoing results by providing a yielding sound box support, which supports the box independently of the diaphragm, and the sound waves are therefore not conveyed to the diaphragm through

the box support, as is the case where the weight of the box comes on the diaphragm.

A further object of my invention is to combine a particular form of needle, with a yielding sound box support which supports the box independently of the diaphragm, and the sound waves are therefore not conveyed to the diaphragm through the box support, as is the case where the weight of the box comes on the diaphragm.

In the accompanying drawings, Figure 1 is a perspective view of a sound box with my improvement therewith, the same being shown in connection with a section of the record. Fig. 2 is an enlarged edge view of my improvement showing a section of the sound box. Fig. 3 is a perspective view of my improvement showing the parts in their relative separated positions. Fig. 4 is a detached view of an ordinary stylus bar.

Referring now to the drawings in which similar reference characters refer to the same parts, 1 is a sound box constructed as now in common use. The stylus bar 2 of this sound box is provided with the usual head 3 in which the ordinary needle (not shown) is adapted to be clamped by a thumb screw (not shown) which passes through a screw-threaded opening 4 in the head of the stylus bar.

My present improvement comprises a supplemental needle supporting frame 5 for the sound box. As here shown this frame is provided with two curved or approximately semi-circular arms 6 and these arms telescope into a rubber tube 7 which forms approximately a circular rubber supporting frame which embraces or encircles the periphery of the sound box 1. The approximately double U shaped end 8 forms the head of the supplemental supporting frame. Rigidly or firmly secured to a laterally extending portion 9 of this head 8 is a needle supporting or carrying arm or member 10. This lateral portion 9 has an upturned end 11 which, as here shown, is ring shaped. Fitting within the opening of this ring 11 is a rubber ball or member 12 which has a peripheral groove 13 for the reception of the ring-shaped member 11.

A screw-threaded stem 14 has one end 15



screwed into the opening 4 of the head of the stylus and is preferably provided with an intermediate disk or flange 16 which will rest against the head 3 of the stylus bar when the stem 14 is screwed into position in the head. The opposite and longer end of the screw-threaded stem passes loosely through an opening 17 made in the rubber ball or member 12, the inner portion of the ball fitting or resting against the disk-shaped portion 16. A thumb nut 18 is screwed upon the projecting end 19 of the screw-threaded stem 14 and a celluloid disk 20 is located between the thumb nut 18 and the outer end of the rubber ball 12 for the purpose of preventing friction and wear between the nut 18 and the rubber ball.

A star-shaped needle 21 is here shown as the special form of needle that is carried by the needle supporting arm 10. As this form of needle is fully shown and described in my Patent No. 931,957 dated August 24, 1909 any further detailed description of it here is unnecessary to enable it to be understood.

From the foregoing, attention is directed to the fact that the sound box 1 is supported by the needle through the encircling supplemental frame and independently of the stylus bar. The sound waves are conveyed through the needle to the portions 9 and 11 through the rubber ball to the head of the stylus bar. In this way the scraping of the needle on the record is so cushioned that it is practically not conveyed to the stylus bar and thereby not conveyed to the diaphragm 22. The roughness of the record which causes a scraping of the needle is not conveyed to the diaphragm because it is so fine that it is completely absorbed by the ball through which all sound waves are conveyed to the diaphragm, but whether this be true or not, I find that this scraping noise is in this construction almost wholly cut out and therefore is not conveyed to the diaphragm. On the other hand, I find that the recorded sound waves are all completely conveyed to the diaphragm and that the reproduction of the sound waves is much more perfect than where the needle supports the sound box directly through the stylus bar as in the sound boxes in common use. Further than this by means of the adjustable thumb nut 18, the rubber ball may be compressed and thereby the loudness of the tone is increased, or it can be turned to release the compression thereby softening the tone of the sound waves. In fact, I find that by this device the sound waves can be modified or modulated from very soft to loud, or to any degree between very soft and loud to suit the operator.

I find by actual tests in order to get the full advantage of this improvement, it is necessary to use a star type of needle and

that the full benefit of the invention can be obtained only with that type of needle. I also find by actual test that to get the best results, it is necessary that the rubber member 12 be of approximately spherical shape.

Having thus fully described my invention what I claim and desire to secure by Letters Patent is:

1. The combination with a sound box of a talking machine, of a supplemental frame yieldingly connected therewith, a stylus bar, a needle support connected to the frame, whereby the sound box is supported by the needle independently of the stylus bar, and a connection between the needle support and the free end of the stylus bar.

2. The combination with a sound box of a talking machine, of a supplemental frame yieldingly connected therewith, a stylus bar, a needle support connected with the frame to support the box independently of the stylus bar, and a yielding connection between the needle support and the free end of the stylus bar.

3. The combination with a sound box of a talking machine, of a supplemental frame yieldingly connected with the box, a stylus bar, a needle support connected with the supplemental frame independently of the stylus bar, a yielding connection between the needle support and the free end of the stylus bar, and means for regulating the tension of the last said yielding means.

4. The combination with a sound box of a talking machine, of a supplemental supporting frame yieldingly connected therewith, a stylus bar, a needle support connected with the said supplemental frame, a rubber connection between the needle support, and the free end of the stylus bar, and means for compressing and releasing the tension of the rubber connection for modifying the conveyance of the sound waves to the stylus bar.

5. The combination with a sound box of a talking machine, of a supplemental supporting frame yieldingly connected therewith, a stylus bar, a needle support connected with the said frame, a yielding connection between the needle support and the free end of the stylus bar, and a star needle carried by the free end of the needle support.

6. The combination with a sound box of a talking machine, of a supplemental frame encircling the periphery of the sound box with a yielding connection between the frame and the sound box, said supplemental frame having a projecting head portion, a stylus bar, a needle support carried by the said frame head, and a yielding connection between the needle support and the free end of the stylus bar.

7. The combination with a sound box of a talking machine, of a supplemental supporting frame encircling the periphery of

the sound box, the encircling portion of the frame being inclosed within a rubber sheathing which intervenes between the frame and the sound box, the said frame having a projecting head portion, a stylus bar, a needle support carried by the head portion, a yielding connection between the yielding support and the free end of the stylus bar, and means for regulating the tension of the yielding support for the purpose described.

8. The combination with a sound box of a talking machine, of a supplemental supporting frame encircling the periphery of the sound box, the encircling portion of the frame having a yielding portion between it and the sound box, the said frame having a projecting head portion, a stylus bar, a needle support carried by the head portion, and a yielding connection between the needle support and the free end of the stylus bar.

9. The combination with a sound box of a talking machine, of a supplemental supporting frame encircling the periphery of the sound box, a rubber sheathing for the encircling portion of the frame between it and the sound box, a stylus bar, a needle support carried by the frame, and a yielding connection between the needle support and the free end of the stylus bar.

10. The combination with a sound box of a talking machine, of a supplemental sup-

porting frame encircling the periphery of the sound box, the encircling portion having a rubber sheathing intervening between it and the sound box, the said frame having a projecting head portion, a stylus bar, a needle support carried by the head portion, the head portion carrying a laterally extending member, a rubber ball intervening between the laterally extending member and the free end of the stylus bar, and means for regulating the tension of the rubber ball.

11. The combination with a sound box of a talking machine, of a supplemental supporting frame encircling and yieldingly connected with the periphery of the sound box, the sound box having a stylus bar with a free end projecting therefrom, a needle support carried by the supporting frame, a screw-threaded stem projecting from the free end of the stylus bar and a rubber ball connection between the needle support and the screw-threaded stem, and an adjustable nut on the stem for varying the tension of the rubber ball for the purpose described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

MINARD A. POSSONS.

Witnesses:

L. M. KELLY,  
F. T. BATCHELOR.



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